

2000

Casualty Actuarial Society



SYLLABUS OF
Examinations

Casualty Actuarial Society



2000 Syllabus of Examinations

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CASUALTY ACTUARIAL SOCIETY
LIBRARY

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**For details about where to send registrations,
orders, and payments, please see page 7.**

Notice to Candidates

Including Important Changes to the
2000 CAS *Syllabus of Examinations*

1. New Education and Examination Structure

With the 2000 *Syllabus of Examinations*, the Casualty Actuarial Society is implementing a new education and examination structure that was announced in June 1997 and clarified over the past two years.

2. Only One Deadline—No Late Registrations to be Accepted

There is only one registration deadline for each exam session. No late registrations will be accepted. Deadlines are listed on page 6.

3. Exams 1-4

Exams 1-4 are jointly administered by the Casualty Actuarial Society and the Society of Actuaries through Preliminary Actuarial Examinations. Details are available in this *Syllabus* as well as the Society of Actuaries' *Catalog*. The registration form for Exams 1-4, as well as the order form for study notes, will be available in the Students' Corner of the CAS Web Site (www.casact.org) or the CAS Office on December 1, 1999.

4. Requirements for Admission to Examination Center

To be admitted into an examination center, each candidate must present a positive identification with a signature and a photograph (e.g., driver's license, passport, school or work ID, etc.). If a photo ID is not available, the candidate must present *two* forms of identification with a signature, with at least one form containing a physical description (height, weight, hair color, eye color, etc.). Each candidate will be required to sign in at the examination center. A candidate who does not present positive identification or who refuses or is unable to provide a matching signature will not be permitted to write the examination. For Exams 1-4, candidates also must present a valid Ticket of Admission that will be sent with *Instructions to Candidates* from Preliminary Actuarial Examinations.

5. Preliminary Answers for Exams 5-9

Approximately one week after CAS Exams 5-9 have been completed, a *preliminary* list of multiple-choice and true/false answers for these examinations will be posted on the CAS Web Site (www.casact.org) in the Students' Corner. This will assist candidates and the Examination Committee in determining whether they believe a question is ambiguous or defective. For details, see page 17.

6. CAS Policy on Examination Discipline

The CAS Board of Directors approved the following addition to the CAS Policy on Examinations Discipline:

If an actuarial organization with which the CAS has a working relationship (such as the Society of Actuaries) invokes a penalty against a candidate for improper conduct during an examination for which the CAS is not a joint sponsor, the CAS will invoke the same penalty for all CAS sponsored examinations. If the CAS takes any disciplinary action, it will notify the other actuarial organizations of that action.

7. Date of Examinations

The Spring 2000 CAS Examinations will be held in May; the Fall 2000 CAS Examinations will be held in late October and November. Exact dates are listed on page 5.

8. Materials for Study

Please refer to the appropriate examination section for reading lists. Please note that **NEW** and **SKU** (Study Kit Updates) are not listed because of the significant changes in the new structure of the CAS examinations.

9. Readings

The items in this *Syllabus* were chosen for their educational value. They are intended to expose the candidate to a wide range of information and to a variety of methods, opinions, and practices in the casualty actuarial field. Inclusion of material in the *Syllabus* does not imply that the CAS endorses any of the views, methodologies, or techniques therein.

10. Testing of Material

The CAS will test the candidate's knowledge of the *Syllabus* material,

11. Obtaining Examination Booklet (Exams 5-9)

For Exams 5-9, a candidate wishing to obtain his or her own examination booklet and scrap paper subsequent to the examination should bring a self-addressed stamped envelope to the examination center. The recommended minimum postage is \$2.31 for domestic mail in the U.S.

12. CAS Web Site

The *Syllabus of Examinations* is available in the Students' Corner of the CAS Web Site (www.casact.org). The "List of Passing Candidate Numbers," *Future Fellows*, *Notice of Examinations*, updates to the 2000 *Syllabus*, and other important notices also will be posted in the Students' Corner.

Foreword

Actuarial science originated in England in 1792 in the early days of life insurance. Because of the technical nature of the business, the first actuaries were mathematicians. Eventually, their numerical growth resulted in the formation of the Institute of Actuaries in England in 1848. Eight years later, in Scotland, the Faculty of Actuaries was formed. In the United States, the Actuarial Society of America was formed in 1889 and the American Institute of Actuaries in 1909. These two American organizations merged in 1949 to become the Society of Actuaries.

In the early years of the 20th Century in the United States, problems requiring actuarial treatment were emerging in sickness, disability, and casualty insurance—particularly in workers compensation, which was introduced in 1911. The differences between the new problems and those of traditional life insurance led to the organization of the Casualty Actuarial and Statistical Society of America in 1914. Dr. I.M. Rubinow, who was responsible for the Society's formation, became its first president. At the time of its formation, the Casualty Actuarial and Statistical Society of America had 97 charter members of the grade of Fellow. The Society adopted its present name, the Casualty Actuarial Society, on May 14, 1921.

The purposes of the Society are to advance the body of knowledge of actuarial science applied to property, casualty, and other similar risk exposures, to establish and maintain standards of qualification for membership, to promote and maintain high standards of conduct and competence for the members, and to increase the awareness of actuarial science. The Society's activities in support of this purpose include communication with those affected by insurance, presentation and discussion of papers, attendance at seminars and workshops, collection of a library, research, and other means.

Since the problems of workers compensation were the most urgent at the time of the Society's formation, many of the Society's original members played a leading part in developing the scientific basis for that line of insurance. From the beginning, however, the Society has grown constantly, not only in membership, but also in range of interest and in scientific and related contributions to all lines of insurance other than life, including automobile, liability other than automobile, fire, homeowners, commercial multiple peril, and others. These contributions are found principally in original papers prepared by members of the Society and published annually in the *Proceedings of the Casualty Actuarial Society*. The presidential addresses, also published in the *Proceedings*, have called attention to the most pressing actuarial problems, some of them still unsolved, that have faced the industry over the years.

The membership of the Society includes actuaries employed by insurance companies, industry advisory organizations, national brokers, accounting firms, educational institutions, state insurance departments, and the federal government. It also includes independent consultants. The Society has two classes of members, Fellows and Associates. Both classes require successful completion of examinations

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.....	Inside Back Cover
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Application Form for Fall 2000 CAS Examinations 6 and 9	(Blue)
Order Form for Study Material for Fall 2000 CAS Examinations	(White)

Application forms for Exams 1-4 will be available in the Students' Corner of the CAS Web Site (www.casact.org) by December 1, 1999.

INTRODUCTION

Syllabus Goals and Objectives

One of the primary objectives of the Casualty Actuarial Society (CAS) is the development of qualified professionals in the field of casualty actuarial science. The CAS conducts an educational and examination program for prospective members in order to achieve this objective. The *Syllabus* goals and objectives are as follows:

1. To develop a general understanding of the social, political, regulatory, legal, economic, and financial environment of the business of property and casualty insurance and the historical development of that environment.
2. To develop a thorough understanding of the fundamental mathematical concepts applicable to solving insurance problems and a high degree of skill in their applications.
3. To develop a comprehensive understanding of the business of property and casualty insurance, including underwriting, claims, marketing, and finance, and how these functions are performed and interrelate.
4. To develop a working knowledge of insurance policies and contracts.
5. To develop an expert knowledge of a broad range of techniques to solve insurance problems; and to develop the ability to discern the appropriateness of techniques for particular applications based on a knowledge of the underlying assumptions, strengths, and weaknesses.
6. To develop an expert knowledge of a broad range of relevant and standard actuarial practices in order to present a framework for the use of problem-solving techniques.
7. To encourage a sense of inquisitiveness and creativity toward insurance problem solving in order to foster an appreciation of the art in actuarial science.

NOTE: The items in this *Syllabus* were chosen for their educational value. They are intended to expose the candidate to a wide range of information and to a variety of methods, opinions, and practices in the casualty

Education and Examination System

The CAS Vice President-Admissions supervises the CAS education and examination system. The Vice President-Admissions is supported by the following four admissions committees.

CAS Education Policy Committee

The Education Policy Committee establishes the goals and objectives of the CAS education and examination system to ensure that the needs of the Society, its members, and its potential members are met. The committee also monitors the operations of the other educational and examination committees to ensure continued effectiveness.

CAS Syllabus Committee

The Syllabus Committee determines the scope and content of the CAS *Syllabus* and course of readings for CAS Examinations.

A chairperson supervises the committee that is composed of Fellows who represent a broad spectrum of CAS members including insurers, consultants, regulators, and academicians. At least one representative of the Canadian Institute of Actuaries (CIA) also serves on the committee; usually at least one of the representatives is a member of the CIA Education and Examination Committee. One or more members specialize in the material for each examination part. These specialists recommend changes to the *Syllabus*; however, recommendations must be approved by the entire committee.

The "Materials for Study" are reviewed regularly by members of the Syllabus Committee. Both short- and long-term goals for improvement are developed. Textbooks and articles may be designated for inclusion. If the committee determines that new study material needs to be developed or that existing material needs to be revised, the committee may commission the creation of Study Notes for inclusion. Every effort is made to develop material that is appropriate, relevant, up-to-date, concise, and well-written. Suggestions for improvement are always welcome and should be directed to the Syllabus Committee at the CAS Office address.

CAS Examination Committee

The Examination Committee organizes, manages, administers, and grades

several senior committee officers with the title of general officer. The committee is subdivided into Examination Part Committees, each headed by an examination part chairperson.

The committee work is similar for both the jointly administered Exams 1-4 and the CAS-specific Exams 5-9. The following provides details about the CAS-specific examinations.

The responsibility for each CAS Examination is assigned to a part committee that writes, grades, and maintains the standards for that examination. Each part committee is assisted by two examination consultants who are CAS members and are experts on the material covered by that examination. The part committees are also assisted by a proofreader who concentrates on uniformity and grammar. In addition, some part committees are assisted by academic consultants who are independent experts from the academic community.

Each examination is drafted by the responsible Examination Part Committee to test candidates' knowledge of the items listed in the "Materials for Study." The individual part committee, examination consultants, one of the Examination Committee general officers, the Examination Committee chairperson, and, in some cases, academic consultants review each examination to assure its quality.

Every effort is made to ensure that the questions fall within the scope of the "Materials for Study." Complete coverage of all material is not practical for every examination every year. The goal is to produce examinations that contain representative, high-quality questions that test candidates' knowledge of the material. Trick questions are deliberately avoided, and the wording of each question is considered carefully to eliminate possible ambiguities. Preliminary versions of each examination are thoroughly reviewed in relation to all of these factors before the final examination is approved.

CAS Student Liaison Committee

The Student Liaison Committee strives to focus on issues of importance to candidates who are taking CAS Examinations. The committee serves as a direct point of contact for students to voice individual or group concerns regarding the education and examination process. It also provides a means for an exchange of information between students and the admissions committees via *Future Fellows*, a newsletter that it publishes quarterly. Two candidates who are actively involved in the examination process serve as advisors to the committee.

2000 CAS SYLLABUS SUMMARY

Associateship Examinations

Exam	Subjects
1*	Mathematical Foundations of Actuarial Science
2*	Interest Theory, Economics, and Finance
3*	Actuarial Models
4*	Actuarial Modeling
5	Introduction to Property and Casualty Insurance and Ratemaking
6	Reserving, Insurance Accounting Principles, and Reinsurance
7†	Nation-Specific: Annual Statement, Taxation, and Regulation

Fellowship Examinations

Exam	Subjects
8	Investments and Financial Analysis
9	Advanced Ratemaking, Rate of Return, and Individual Risk Rating Plans

2000 CAS EXAMINATION SCHEDULE

Spring 2000

EXAM	DATE	ZONE	START TIME	FINISH TIME
1	05/24/2000*	All time zones	8:30 a.m.	11:30 a.m.
2	05/25/2000*	All time zones	8:30 a.m.	12:30 p.m.
3	05/18/2000*	All time zones	8:30 a.m.	12:30 p.m.
4	05/17/2000*	All time zones	8:30 a.m.	12:30 p.m.
5	05/01/2000	North and South America	9:30 a.m.	1:30 p.m.
5	05/01/2000	Europe, Africa, Asia, Australia	1:00 p.m.	5:00 p.m.
7	05/02/2000	North and South America	9:30 a.m.	1:30 p.m.
7	05/02/2000	Europe, Africa, Asia, Australia	1:00 p.m.	5:00 p.m.
8	05/03/2000	North and South America	9:30 a.m.	1:30 p.m.
8	05/03/2000	Europe, Africa, Asia, Australia	1:00 p.m.	5:00 p.m.

Fall 2000

EXAM	DATE	ZONE	START TIME	FINISH TIME
1	11/09/2000*	All time zones	8:30 a.m.	11:30 a.m.
2	11/08/2000*	All time zones	8:30 a.m.	12:30 p.m.
3	11/07/2000*	All time zones	8:30 a.m.	12:30 p.m.
4	11/06/2000*	All time zones	8:30 a.m.	12:30 p.m.
6	10/31/2000	North and South America	9:30 a.m.	1:30 p.m.
6	10/31/2000	Europe, Africa, Asia, Australia	1:00 p.m.	5:00 p.m.
9	11/01/2000	North and South America	9:30 a.m.	1:30 p.m.
9	11/01/2000	Europe, Africa, Asia, Australia	1:00 p.m.	5:00 p.m.

Note: Starting time for examinations is local time for the specified zone.

*Exams 1-4 are jointly administered by the Casualty Actuarial Society and the Society of Actuaries through Preliminary Actuarial Examinations. Final information for jointly administered examinations can be obtained from the CAS Web Site (www.casact.org), the

EXAMINATION RULES

Registration

Administration of Examinations

The CAS education structure has nine examinations and the Course on Professionalism. Exams 1-4 are jointly administered by the CAS and the Society of Actuaries (SoA) through Preliminary Actuarial Examinations. Exams 5-9 and the Course on Professionalism are exclusively administered by the CAS. The CAS is a joint sponsor of the prizes awarded for the highest scores on Exam 1.

Filing of Applications

All candidates filing for an examination(s) must submit an application for each examination period (Spring and/or Fall). Application forms are enclosed in this *Syllabus* or may be downloaded from the CAS Web Site (www.casact.org). Payment must accompany each application. Applications must be received by the following deadlines:

Spring 2000	Registration Deadline
Exams 1-4	April 1, 2000
Exams 5, 7, 8	March 23, 2000
Fall 2000	Registration Deadline
Exams 1-4	October 1, 2000
Exams 6, 9	September 21, 2000

Please allow at least 10 working days for your application to reach its destination. Whether payment is made by personal or company check, it is the **candidate's responsibility to ensure that the application is received by the stated deadline**. Exceptions will not be made. Send applications as follows:

Exams 1-4

Exams 1-4 are administered by Preliminary Actuarial Examinations for the CAS and SoA. Candidates must send an original signed application for the examination session. Unsigned, photocopied or facsimile applications are not valid. All applications must include an original signature. Fees should

Actuarial Examinations has received an original, signed application for the examination session. Please send application with payment to:

Preliminary Actuarial Examinations

[The application form and mailing details for Preliminary Actuarial Examinations were not available at press time. This information will be posted in the Students' Corner of the CAS Web Site (www.casact.org) after December 1, 1999.]

Applications must be received prior to the published deadlines.

Exams 5-9

If paying in U.S. or Canadian funds by check, draft, or money order (payable to the "Casualty Actuarial Society"), send payment and application to:

Casualty Actuarial Society
P.O. Box 425
Merrifield, VA 22116-0425

If paying by credit card (MasterCard, Visa, American Express, Diners Club, or Discover), all fees will be processed in U.S. funds (please indicate fees accordingly). Send application to:

Casualty Actuarial Society
1100 N. Glebe Road, Suite 600
Arlington, VA 22201-4798

Candidates will receive an acknowledgment of receipt of their application within three weeks of the date that the application form was received at the CAS Office beginning February 1 for Spring examinations and August 1 for Fall examinations. This acknowledgment is the candidate's receipt of examination fees paid. Please retain this acknowledgment for tax purposes if needed.

Applications must be received prior to the published deadlines.

Fees

Examination fees must be paid each time a candidate registers for an examination. Payment options are described in the previous section, Filing of Applications. (A \$15 surcharge will be assessed for all returned checks. CAS Canadian fees include a \$4 service charge.)

The charts below show the examination fee schedules for Spring 2000 and

Spring 2000 Examination Fees

	Candidates		Candidates who are Full-Time Students	
	US\$	CAN\$	US\$	CAN\$
Exam 1	\$75	<i>See note below.</i>	\$75	<i>See note below.</i>
Exam 2	\$100		\$100	
Exam 3	\$275		\$220	
Exam 4	\$275		\$220	
Exam 5	\$300	\$448	\$240	\$359
Exam 7	\$300	\$448	\$240	\$359
Exam 8	\$300	\$448	\$240	\$359

NOTE: For Exams 1-4, candidates may submit the Canadian equivalent of all U.S. fees at the time of registration to Preliminary Actuarial Examinations (PAE).

Fall 2000 Examination Fees

	Candidates		Candidates who are Full-Time Students	
	US\$	CAN\$	US\$	CAN\$
Exam 1	\$75	<i>See note above.</i>	\$75	<i>See note above.</i>
Exam 2	\$100		\$100	
Exam 3	\$275		\$220	
Exam 4	\$275		\$220	
Exam 6	\$300	\$448	\$240	\$359
Exam 9	\$300	\$448	\$240	\$359

Other Fees

	US\$	CAN\$
Refund (Exams 1-4)	\$50	<i>Contact PAE.</i>
Refund (Exams 5-9)	\$60	\$93
Exam Center Outside U.S. or Canada	\$40	\$63
Change of Exam Center	\$30	\$48
Special Exam Center	\$50	\$78
Translation Fee (Exams 5-9) <i>For Each Examination</i>	\$200	\$300

Examination Centers

Examination centers are listed on the application. Centers are determined by the number of candidates near a center and the availability of proctors. Special examination centers may be arranged at the discretion of the CAS

Ticket of Admission (Exams 1-4 Only)

For Exams 1-4, Preliminary Actuarial Examinations will send each candidate: 1.) a Ticket of Admission which indicates the examination(s) for which the candidate is registered, and 2.) the *Instructions to Candidates* which covers administrative details about the examination as well as exact examination center locations. Tickets of Admission will be mailed beginning March 1 for the Spring session and September 1 for the Fall session. This Ticket of Admission should be brought to the examination center and should be retained after the session is completed.

A candidate who has not received a Ticket of Admission two weeks prior to the examination, or whose ticket contains incorrect information, should contact the Society of Actuaries or the Casualty Actuarial Society. The Ticket of Admission also serves as a receipt and should be retained if needed for tax purposes.

Change of Center

Any registered candidate who requests a change in examination center must pay a change-of-center fee. No requests will be accepted after the registration deadline.

If a request for a change-of-center occurs, every effort will be made to have the candidate's records and supplies on hand at the appropriate center in time for the examination. If this effort fails, however, the administering organizations are not responsible. If either a candidate's registration and fees, or request for change-of-center, are received so late that it is not feasible to arrange for the candidate to write the examination, the fees will be refunded in full. The administering organizations are not responsible for difficulties caused by postal service delays or inadequate postage.

Examination Centers Outside the United States or Canada

Candidates wishing to take Exams 5-9 outside the United States or Canada should include an additional fee of \$40 (\$63 Canadian). Requests must be made at least two months prior to the examination date.

Languages Other than English

Exams 1-4

Examination questions and instructions will be printed and examinations

Exams 5-9

Examination questions and instructions will be printed, and examinations administered, exclusively in English. Should a candidate wish to respond to any or all of the essay questions in a language other than English, advance notice of the language selected must be provided to the CAS Office when applying to write an examination. Provided such advance notice was received and a suitable translator is available, responses submitted in languages other than English will be translated into English by qualified translators and graded exclusively in translation. If advance notice has not been provided, non-English responses will not be graded. For non-English responses provided in languages other than French, a translation fee of \$200 per examination must be submitted along with the examination fee. If a suitable translator cannot be engaged prior to the date of the examination, the candidate will be notified and the translation fee refunded. The CAS cannot guarantee the accuracy of any translation. Appeals based upon errors in translation of candidates' responses will not be considered. Grade reports for examinations requiring translation may be delayed.

Special Arrangements for Candidates with a Disability

A candidate with a disability who needs special testing arrangements must submit a written request to Preliminary Actuarial Examinations (for Exams 1-4) or the CAS (for Exams 5-9) for each examination the candidate intends to write. Documentation of the disability (e.g., physician's statement, diagnostic test results), as well as the need for special arrangements, are required of each candidate; previous accommodations given to the candidate in an educational program or work setting may be considered. Requests for special arrangements and supporting documentation must be submitted at the applicant's expense at least two weeks prior to the registration deadline.

Refunds

Exams 1-4

Any candidate who submits an application for Exams 1-4 and subsequently does not write the examination should submit a written request for an examination fee refund. This request must reach Preliminary Actuarial Examinations not later than June 30, 2000 for the Spring Examinations or December 31, 2000 for the Fall Examinations. Later requests will not be

Exams 5-9

Any candidate who submits an application for Exams 5-9 and subsequently does not write the examination should submit a written request for an examination fee refund. This request must reach the CAS Office not later than June 30, 2000 for the Spring Examinations, or December 31, 2000 for the Fall Examinations. Later requests will not be considered. A fee of \$60 (\$93 Canadian) per examination will be assessed for all refunds. Change-of-center fees, special center fees and other additional fees will not be refunded in any case. Checks will be issued one month after the deadline for refunds.

The Examination

Introduction

The examinations for admission to the Casualty Actuarial Society are designed to establish the qualifications of candidates. It should be realized that while the examination questions will be largely based upon the textual material cited, they will not necessarily be drawn directly therefrom. The examinations will test not only candidates' knowledge of the subject matter, but also candidates' ability to apply that knowledge. In the development of *Syllabus* readings and examination questions, it is assumed that candidates are familiar with the material covered in earlier examinations. Therefore, it is recommended that candidates take the earlier examinations in numerical order.

Requirements for Admission to Examination Center

To be admitted into an examination center, each candidate must present a positive identification with a signature and a photograph (e.g., driver's license, passport, school or work ID, etc.). If a photo ID is not available, the candidate must present *two* forms of identification with a signature, with at least one form containing a physical description (height, weight, hair color, eye color, etc.). Each candidate will be required to sign in at the examination center. A candidate who does not present positive identification or who refuses or is unable to provide a matching signature will not be permitted to write the examination. For Exams 1-4, candidates also must present a valid Ticket of Admission that will be sent with *Instructions to Candidates* from Preliminary Actuarial Examinations.

Candidates should arrive at the examination center at least 45 minutes to one hour before the examination is scheduled to begin. Candidates may not leave until two hours after the start of the examination. For Exams 5-9, candidates may not leave during the last 15 minutes of the examination.

Conduct of Examinations

The examinations are recorded exclusively in writing. Except as is noted in the following paragraphs, no books, papers, typewriters, slide rules, or electronic or mechanical aids for computation of any kind may be brought

For Exams 5-9, a candidate wishing to obtain his or her own examination booklet and scrap paper subsequent to the examination must bring a self-addressed stamped envelope to the examination center. The recommended minimum postage is \$2.31 for domestic mail in the U.S. Approximately one week after all examinations have been completed, a *preliminary* list of multiple-choice and true/false answers for Exams 5-9 will be posted in the Students' Corner of the CAS Web Site (www.casact.org). Sample solutions for essay questions will not be available until they are published on July 31, 2000 for Spring Examinations and January 31, 2001 for Fall Examinations.

Calculators

Electronic calculators will be allowed in the examination room for all examinations. Candidates may use the battery- or solar-powered models of the following Texas Instruments calculators: BA-35 (the official CAS/SoA calculator), TI-30X, or TI-30Xa. The CAS logo is not required on the calculator. Candidates may use more than one of the approved calculators during the examinations. For candidates who cannot locate the TI-30Xa model, the CAS Office will have the calculator available (see order form). **Any unauthorized calculator brought to the examination center will be confiscated for the duration of the examination.**

It is the candidate's responsibility to see that the calculator used during the examination is in good working order. Supervisors will have a spare approved calculator available for a candidate whose calculator may malfunction. It is not to be distributed to a candidate without a calculator or whose unauthorized calculator has been confiscated.

Examination Discipline

Candidates must not give or receive assistance of any kind during the examination. Any cheating, attempt to cheat, assisting others to cheat, participating therein, or engaging in such improper conduct as listed below, is a serious violation and will result in the CAS disqualifying the candidate's paper, and other disciplinary action as may be deemed appropriate. Candidates have agreed in their applications for examination to be bound by the rules and regulations governing the examinations.

Examples of improper conduct include but are not limited to:

1. Gaining access to examination questions before the examination or aiding someone else to do so.

4. Marking or otherwise writing on the examination book or answer sheet before the signal to begin is given.
5. Making any changes, additions, deletions, or otherwise marking, erasing, or writing on the examination book or answer sheet after the time for the examination has expired.
6. Having access to or consulting notes or books during the examination.
7. Looking at or copying from another candidate's paper.
8. Enabling another candidate to copy from one's paper.
9. Talking or otherwise communicating with another candidate during the examination.
10. Disturbing other candidates during the examination.
11. Consulting other persons outside the examination room during the examination.
12. Copying questions, answers, or answer choices to take from the examination room.
13. Taking an examination book from the examination room.
14. Taking an examination for another candidate.
15. Arranging to have another person take an examination for the candidate.
16. Threatening or verbally abusing a supervisor or proctor responsible for curbing or reporting improper conduct.
17. Disclosing the contents of an examination to any other person.
18. Presenting false information on an examination application.
19. Failing to remain in the examination room for a minimum of two hours during the examination.
20. Failing to follow other examination instructions.

The CAS Examination Committee, or its designee, will investigate any irregularity or suspected violation of the rules involving the examination process, and a determination will be made regarding the matter. Where there is a determination to invoke a penalty, the candidate is advised by letter. In the case of a candidate who is a member of the CAS, the candidate's conduct will be reported to the Actuarial Board for Counseling and Discipline (ABCD) or to the Canadian Institute of Actuaries (CIA) if

as announcements made by the supervisors at the examination locations. All candidates, on their applications for examinations, are required to read and sign the following statement: "I have read the rules and regulations concerning the examination(s) for which I am applying and agree to be bound by them. I also agree that the results of any examination(s) which I take, and any action taken as a result of my conduct may, at the sole discretion of the Casualty Actuarial Society [and/or the Society of Actuaries for jointly administered Exams 1-4], be disclosed to any other bona fide actuarial organization that has a legitimate interest in such results and/or actions."

The CAS may, at its sole discretion, disclose to any other bona fide actuarial organization having a legitimate interest, information on the identity of candidates determined to have committed a serious examination violation (those for which the penalty is greater than the simple disqualification/nullification of the examination), and the specific penalties imposed on those candidates.

If an actuarial organization with which the CAS has a working relationship (such as the Society of Actuaries) invokes a penalty against a candidate for improper conduct during an examination for which the CAS is not a joint sponsor, the CAS will invoke the same penalty for all CAS sponsored examinations. If the CAS takes any disciplinary action, it will notify the other actuarial organizations of that action.

These standards may seem stricter than those which candidates are accustomed to in other examination environments. The CAS maintains these strict standards because the examinations are such a significant part of a candidate's career. Therefore, the equitable administration of the examinations and enforcement of the highest standards of conduct cannot be emphasized too strongly.

Candidates who wish to obtain a copy of the full CAS Policy on Examination Discipline should make a request in writing to the CAS Office.

Multiple-Choice Questions

Exams 1-4 consist entirely of multiple-choice questions; other CAS examinations have a section of multiple-choice and/or true/false questions. Each multiple-choice problem includes five answer choices identified by the letters A, B, C, D, and E; only one of which is correct. A separate answer sheet provides a row of five ovals for each problem, identified with the letters A, B, C, D, and E, corresponding to the five answer choices. After deciding which answer is correct, candidates should blacken the oval

Guessing Adjustment

For Exams 1-4, no guessing adjustment is made to candidates' scores. Therefore, candidates will maximize their scores on the joint examinations by answering every question.

On Exams 5-9, multiple-choice and true/false questions are scored in such a way that there is no advantage or disadvantage to be anticipated from guessing answers in a purely random fashion as compared with omitting the answers entirely. No additional points will be given for multiple-choice questions left blank, but one-quarter of the point value for each question will be deducted for each incorrect answer. On true/false questions, the point value of the question will be deducted for each incorrect answer.

Lost Examinations

The CAS is not responsible for lost or destroyed examinations. In the case where an examination is lost or destroyed, the examination fee will be refunded. The CAS and other organizations that jointly administer and/or jointly sponsor CAS Examinations will assume no other obligation and candidates must take the examinations with this knowledge.

The one exception to this policy is for multiple-choice Exams 1-4. Whenever reasonably possible, Preliminary Actuarial Examinations will make use of a candidate's examination book to reconstruct the answers selected by the candidate. Therefore, candidates may want to circle or otherwise clearly indicate their answer choices in the examination books. However, additional time in the examination period will not be given for candidates to do this. If a candidate receives a passing grade as a result of the review of the examination book, the examination fee will not be refunded.

Grades and Accreditation

The actual grading process is fairly similar for both the jointly administered Exams 1-4 and the CAS-specific Exams 5-9. The following provides details about CAS-specific Exams 5-9.

CAS Examination Processing

Examination papers are sent to the CAS Office upon completion of the examination. The CAS Office prepares the examinations for the grading process. Approximately one week after all examinations have been completed, a *preliminary* list of multiple-choice and true/false answers will be posted in the Students' Corner of the CAS Web Site (www.casact.org). This is intended to assist candidates and the Examination Committee in determining whether they believe a question is ambiguous or defective.

Defective Questions

Occasionally, through error or because of varying interpretations, a question on an examination is found to be ambiguous or defective. If a candidate believes a question is ambiguous or defective, he/she should bring this to the attention of the Examination Committee in writing within two weeks after the examination date. The candidate may fax this letter to Preliminary Actuarial Examinations for Exams 1-4 or to the CAS Office for Exams 5-9. The letter should include detailed reasons why the question is believed to be ambiguous or defective.

The CAS Examination Committee or Preliminary Actuarial Examinations will investigate all questions brought to their attention in this manner. Correspondence that does not reach these organizations within two weeks is unlikely to be considered in the grading process.

Any multiple-choice or true/false question found to be defective is carefully examined to determine the most reasonable way to correct the situation. In some cases, the question is discarded, leaving scores and rankings as they would have been if the defective question had not been asked. In other cases, more than one answer for a multiple-choice question is given credit for being correct.

Grading of Examinations

Answers to multiple-choice and true/false questions are read by optical

Every effort is made to grade answers to essay questions according to completely objective standards. The anonymity of the candidates is fully preserved; committee members see only candidate numbers when grading an examination, not candidate names.

A model answer is developed for each essay question prior to grading, including the recommended numerical value for each sub-point in the answer. Each question is assigned to two graders who separately and independently grade the candidates' answers using the model answer as a guide. After grading a sufficient number of papers, each grader evaluates the model answer in light of the responses. If either grader believes that the model answer or the values assigned for sub-points should be revised, the two graders confer and revise the model answer, if necessary. Then both graders restart the grading process. After all papers have been graded, the two graders compare the scores assigned to each candidate for that question and reconcile differences.

After all questions have been graded, the multiple-choice scores and essay scores are combined, and candidates are ranked in order by score. A preliminary pass mark is established, and the answers given by candidates near the preliminary pass mark are regraded. The candidates are reranked after the regrading, and a final pass mark is determined.

Determination of the Pass Mark

The goal when determining the pass mark is to maintain consistent standards of qualification for membership. Because the level of difficulty for each examination may vary from year to year, each Part Committee collects extensive data to ascertain the level of difficulty of its examination. The Part Committee compares the performance of the present year's candidates to the performance of candidates from prior years. Appropriate recognition is given to any peculiarities that may appear in connection with the answers to any question on an examination despite all the care taken in setting the examination questions. After this, the pass mark is set to achieve the desired consistency. The examination part chairperson presents the recommended pass mark with the supporting data to the general officer who oversees that examination part, the Examination Committee chairperson, and the Vice President-Admissions. The final decision on the pass mark is the responsibility of the Vice President-Admissions. Raw scores and the pass mark are not provided to candidates.

The percentage of candidates passing will vary from year to year, however, those candidates demonstrating the required level of competence with the material will pass.

pass mark. A grade of 0 means that the candidate's score is less than 50 percent of the pass mark. Candidates at or above the passing mark receive a Pass.

Examination Results

Examination results are available approximately eight weeks after the examination date. After examination results are received at the CAS Office, a list of passing candidate ID numbers will be posted in the Students' Corner of the CAS Web Site (www.casact.org).

Individual statements of examination results are mailed to candidates on the day that they are posted on the CAS Web Site. For Exams 5-9, passing candidates are informed that they passed the examination, but they are not given a numeric score. Candidates with scores of 0 to 5 are informed of the score. Several weeks later, a list of the names of all passing candidates is distributed.

Analyses for Exams 5-9

Candidates receiving a grade of 4 or 5 on an examination will automatically receive an analysis of their examination upon grade notification. Other unsuccessful candidates for Exams 5-9 may obtain an analysis of their examination by writing to the CAS Office before July 31, 2000 for Spring Examinations, and January 31, 2001 for Fall Examinations. The analysis of an examination is computer-generated. Actual points received for multiple-choice and true/false questions will be displayed. For essay questions, ranges will be given for both the actual score and how the actual score relates to the mean of all candidates. This information is intended to provide the educational guidance that most candidates desire.

Appeals for Exams 5-9

Once candidates have received an analysis of their exam, they may appeal their grade. Only candidates with valid appeals will be considered. In order to aid the candidate when appealing, preliminary answer keys for multiple-choice and true/false questions will be available the week following the examinations. Sample answers to essay questions will be available not later than July 31, 2000 for Spring Examinations, and January 31, 2001 for Fall Examinations. The sample essay answers are actual responses that have received credit and are illustrative of successful answers, although they may not be considered perfect answers.

There are two types of valid appeals. The first type is an administrative check

alternative correct solution, the candidate must provide specific information on why his or her solution is correct. An example of an invalid appeal would be the following: "I am appealing my score of 5 on Exam 9, please recheck my examination." Another example of an invalid appeal would be: "On question number 2, I believe I should get full credit because I answered the following . . ."

Appeals must reach the CAS Office not later than August 31, 2000 for Spring Examinations and March 1, 2001 for Fall Examinations. When a valid appeal is received, it is reviewed by the part chair and a recommendation is made to the Examination Committee chair. The Examination Committee chair will respond based on the recommendation of the part chair.

Confidentiality of Examination Records

The fact that any candidate has passed a particular examination is considered public knowledge. Any further information as to examinations taken by candidates and scores received by candidates is available only to the candidates themselves, to Examination Committee officials if required for committee purposes, and to the CAS Office, unless the candidate requests in writing that such information be provided to someone else. However, if any action is taken against a candidate as a result of his or her conduct (as described in the section on Examination Discipline), the Casualty Actuarial Society, at its sole discretion, may disclose such information to any other bona fide actuarial organization that has a legitimate interest in such results and/or actions.

Transition Programs

The CAS generally reviews and makes revisions in the study material on an annual basis. Occasionally, a major topic will be added to or deleted from the study material. A major topic is defined as a series of readings comprising a segment of an examination. When a major topic is deleted from the recommended study material, the Syllabus Committee will determine if a transition program is appropriate. A transition program generally will be appropriate when candidates are in a position to lose credit for a segment of an examination.

A transition program usually will provide candidates with at least two opportunities to complete the requirements for that examination part. The completion of the requirements will result in the achievement of credit for that entire examination part. The failure to fulfill the requirements for that complete examination part could result in the expiration of credit for that

CAS Membership Requirements

Those who completed examinations for Associateship or Fellowship through the Fall 1999 session will be admitted under the membership requirements in effect through 1999. Those who complete examinations for Associateship or Fellowship subsequently will be admitted according to the revised requirements noted below.

Associateship

Candidates for Associateship in the Casualty Actuarial Society must fulfill the examination requirements by successful completion of, or credit for, Exams 1 through 7. Exams 1-4 are the same as the Society of Actuaries' Courses 1-4. Exam 7 is nation specific, covering United States or Canadian-specific material, and passage of either of the two examinations fulfills the completion requirements. Candidates must attend the CAS Course on Professionalism prior to admission to the CAS.

After completing the prescribed examination requirements, all prospective Associate members must make formal application to the Casualty Actuarial Society. The CAS Office will mail application materials to these candidates, including instructions for obtaining letters of reference from two CAS members. Obtaining the two letters of reference is the prospective Associate's responsibility. If no members of the CAS are familiar with the prospective Associate and his/her work history, references from members of the American Academy of Actuaries, the Canadian Institute of Actuaries, the Society of Actuaries, or senior executives where the candidate is employed may be substituted. For further information on alternative, acceptable references, please contact the CAS Office. An application for membership will not be processed without these references.

After all requirements are met and application is made, each candidate is voted on by the CAS Executive Council. Upon approval of the CAS Executive Council, the candidate will be admitted as an Associate of the Casualty Actuarial Society (ACAS). Candidates approved by the Executive Council will be notified by letter from the CAS President.

Fellowship

In addition to fulfilling all the requirements of Associateship, successful completion of, or credit for, all nine examinations is required to fulfill the examination requirements for Fellowship and to be designated as a Fellow of the Casualty Actuarial Society (FCAS).

CAS Course on Professionalism

The CAS Course on Professionalism is designed to present candidates with real situations that contain ethical and professional issues for the actuary. Volunteer Fellows of the CAS facilitate small group discussions of actual case studies.

Although grades are not given for the Course on Professionalism, candidates must actively participate in order to receive credit. Successful completion of this course is required before a candidate can become a member of the Casualty Actuarial Society. Candidates are urged to register for this course when they have passed five or more CAS Examinations. (A candidate must have passed five Associateship examinations to be eligible to take the Course on Professionalism.)

Dates for the CAS Course on Professionalism will be published in the newsletter *Future Fellows*. Registered candidates will receive a study book of required readings before the start of the course. Each course is limited to 60 participants; early registration is recommended. Facility information and course times will be provided upon registration.

Waiver of Examinations for Associateship

Waiver of individual examination requirements will be granted by the CAS Board of Directors in instances where an applicant has passed or received credit for examinations sponsored by another recognized actuarial organization that cover equivalent material in both subject and depth. The granting of waivers by the Board will be based on the recommendation of the Vice President-Admissions. The Vice President-Admissions' recommendation will be guided by the policy established by the CAS Education Policy Committee.

The CAS generally will not grant waiver of all or any portion of its examination requirements for either work experience, contribution to actuarial literature, academic courses of study, or examinations of non-actuarial organizations. Individuals who claim competence in the areas covered by the examinations should not have difficulty demonstrating their competence by participating in the examination process.

The CAS recognizes the examinations sponsored by the Institute of Actuaries (United Kingdom), the Institute of Actuaries in Australia, and the Faculty of Actuaries (Scotland). The CAS Education Policy Committee will establish a waiver policy. Credit will be granted for examinations passed or waived in accordance with examination equivalencies between the CAS *Syllabus* and the syllabi of each of the three aforementioned

obtaining membership through the normal qualification/examination process applicable to residents of those countries.

Candidates requesting a waiver of an examination requirement should present their request to the Vice President-Admissions with appropriate evidence that demonstrates the passing of (or score on) the actuarial examination equivalent for which a waiver is requested and an administrative fee of \$40 in U.S. funds. The Vice President-Admissions will review all such requests and recommend action to the CAS Board of Directors.

Please address all waiver requests to:

Vice President-Admissions
Casualty Actuarial Society
P.O. Box 425
Merrifield, VA 22116-0425

Payment of the \$40 fee may be made by credit card (MasterCard, Visa, American Express, Diners Club, or Discover) or by check, draft, or money order payable to the Casualty Actuarial Society.

Waivers are considered on a case-by-case basis for examination equivalents of actuarial organizations not named above, including recognized actuarial organizations outside of the U.S. and Canada that have formal education requirements, but whose only means of qualification are through academic achievement. Candidates must present their requests to the Vice President-Admissions and include with their applications documented evidence that demonstrates the asserted equivalence, as well as the appropriate educational policy material of their local actuarial organizations. If such material is not included, the Vice President-Admissions will request it from the candidates. The Vice President-Admissions will forward the request to the Education Policy Committee for a determination of whether sufficient equivalence exists to permit granting any examination waiver. Waivers are subject to the \$40 administrative fee.

HINTS ON STUDY & EXAM TECHNIQUES

Editor's Note: These hints do not include any material on which candidates will be examined, but are provided by members of the CAS Syllabus and Examination Committees to encourage candidates to do their best when sitting for CAS Examinations.

"Hints On Study & Exam Techniques" is largely based on the experience and advice of others and was originally prepared for Society of Actuaries candidates by James L. Clare. Later, it was adapted by G.D. Morison for use by CAS candidates and was updated in 1992. The CAS will be glad to consider incorporating further comments and suggestions periodically. If you have any changes to suggest, please send them to the CAS Office.

Motivation

Motivation is the single most important ingredient in learning—and in passing examinations. Motivation suffers when candidates worry about or are preoccupied with personal matters or other problems. This suggests that candidates should keep studying and examination taking at the very top of their lists of priorities, and should always have a constructive attitude about their studying. In particular, candidates should approach the examination as an opportunity to enhance their knowledge and understanding of actuarial science, rather than as an obstacle in their paths to membership in the CAS.

Motivation is increased by incentives, such as the following:

- Passing actuarial examinations requires many hours of study—more for some people and less for others—but often more than many candidates realize. Putting in enough hours can actually save a candidate time. Suppose, for example, that mastering the Syllabus for one examination will take a candidate 400 study hours, and that one candidate only puts in 300 hours and fails the examination the first time. He or she then puts in a second 300 hours and passes the examination the second time. That candidate will have spent 600 hours, when by studying 400 hours the first time around, he or she would have saved 200 hours, not to mention passing one year sooner. It is recommended that candidates decide for themselves how many hours they really need to study, and then do that much studying—the first time around.

- Candidates can also increase their motivation through sufficiently intensive and sustained study so that they come to appreciate more fully the fascination of the various subjects, and the interrelationship between them.

A number of doctors, educators, executives, and personnel people all agree that motivation can be greatly increased by having a goal in mind. Candidates must determine their goals and keep them in mind.

Techniques

It has been proven many times in various countries, both by individuals and by controlled groups, that improved study and examination techniques can strengthen a candidate's mastery of a subject and increase his or her examination scores significantly. Provided that the candidate is motivated and spends enough hours studying, techniques such as those given here may often make the difference between failing or passing an examination.

Each person has his or her own strengths and weaknesses, so candidates are advised to work out their own personal sets of techniques which will work best for them. What follows is merely a set of suggestions to help candidates in getting started in building up their own techniques.

The Challenge

It is easy to underestimate the effort that is required because substantial changes may be needed to switch from college or university life to successful study of actuarial examinations.

University courses often stress understanding, and usually do much to smooth the path for the student with lectures, personal contacts, organized places of study, and a focus on learning.

By contrast, actuarial candidates must work a great deal on their own and generally must make a "long and grueling" journey to reach their goals. Much actuarial studying is normally fit in after a full day's work, or is done on a weekend when one's friends are free to do as they please. Making adequate time available for studying requires sustained self-discipline and is a purely individual and personal responsibility.

Schedule of Study

There is only one substitute for hours of study time omitted one week. This is at least as many additional hours of study in another week.

Candidates must decide how many hours in total they need to study. Then they need to set out their schedules in writing, specifically stating the weekday evening and weekend periods allocated to studying. They then should total the number of hours made available. If the total hours scheduled are less than the total hours necessary, candidates should expand their schedules until they at least have equalled the required total time plus an additional cushion for absorbing time that will inevitably be lost along the way on account of illness, work pressures, etc.

Then candidates should fit all the segments of the *Syllabus* into their schedules so that they will thoroughly cover the course of reading in good time before the examination, with time left over for a thorough final review. It is important for candidates to spread their time over the entire *Syllabus* in some deliberate way, for example, in proportion to the pages of reading material on the *Syllabus*.

Candidates may find it helpful to study several subjects within an examination, or all of them in parallel. This gives them more variety each week, and may give them a combination of both study that is more appealing and study that requires greater effort and concentration. Particularly demanding study may be best left for weekends when candidates are less fatigued from regular work.

It is a good idea for candidates to keep a record of the hours they spend studying. Even if candidates are completely confident that they know the *Syllabus* before putting in their required total hours, there is much to be said for carrying out their full schedule and completing their total time quotas.

Retention

As part of human nature, our memories forget facts and ideas most rapidly during the time immediately following our study of them. For a given number of study hours, therefore, candidates will remember more if they review promptly and frequently. It is recommended that candidates review what they have learned as part of ending their study for the day. As they begin their next study session, candidates should review what they learned the last time and what they learned during other recent sessions. Then they can recall points they have learned during odd spare moments in between study sessions. It is important for candidates to leave time for a thorough final review before the examination.

In their study for the mathematical sections of the Associateship examinations, candidates are advised to work out as many examples as possible in order to acquire facility in the application of the mathematical

There are some analogies that can be made between preparing for an actuarial examination and learning to drive a car. Most inexperienced drivers have good motivation for learning to drive and have a strong goal clearly in mind. Yet they still need to practice their driving skills until they become "second nature." This is easier to do if they keep practicing their driving in the days immediately after a lesson. Candidates should equally be the master of their actuarial studies by the time they enter the examination room. Experienced drivers should be able to pass a driving test not just on a few familiar streets, but over any legal route. In the same way, actuarial candidates should be able to pass any set of examination questions which has been drawn from the *Syllabus*.

Candidates should note the considerable emphasis in actuarial examinations on knowledge. However, they should remember that the best way to learn facts by heart is to understand the whole subject, and to tie together ideas which are related. They should look at any single subject from several different angles, relating what they learn to what they know already. Candidates should look for as many connections as they can between their actuarial work and their actuarial studies.

As humans, we learn by doing. While the extent of a candidate's notes will be a matter of his or her own personal tastes, taking thorough notes will be a good investment of time for most people. For candidates, "translating" the subject matter into their own words helps their memories, and forces to their attention those items which they do not really understand and require further study. When, upon reviewing their notes, candidates find gaps in their knowledge or in their understanding, they should bear down on those areas and master them.

Another study technique candidates might want to try is to test themselves as they go along. They can review previous examinations when they start to study to get an idea of the mastery of the *Syllabus* expected. Candidates can also take these as "trial examinations" to help them in testing their knowledge and understanding of the course of reading, and in improving their examination speed and confidence. Some candidates deliberately test themselves; others prefer not to do so.

Candidates should expect a gradual gathering of momentum as they begin their study for a particular examination. By keeping at it, according to their plans, candidates will find their rate of progress speeding up after the first few weeks.

When a candidate finds himself or herself getting very "stale," one possibility is to stop studying altogether for, perhaps, three days. Then the candidate should continue on with his or her study plan, no matter how he or she feels for at least the next month or six weeks. A candidate's study

Discussing the *Syllabus* with friends taking the same examination, or with others who have passed the examination, will help candidates remember the material firmly and to understand it. It also helps candidates to realize their own gaps and difficulties. If effective study circles and tuition courses can be found, they will give candidates a different slant on the subject, give them a chance to review and to practice, keep them moving through the *Syllabus*, and help to combat lethargy and self-satisfaction.

Candidates should beware, however, of someone else doing their own thinking for them. It is imperative that they develop and maintain their own command and understanding of each subject. When reading, candidates should challenge the author in their minds and debate with him or her, rather than merely swallowing everything whole.

Formulating Answers

Multiple-Choice Questions

Candidates can definitely improve their speed and mastery by seriously practicing on sample examination-type questions before the examination. It helps to have a good understanding of the subject material. Candidates can also develop valuable shortcuts, such as eliminating impossible answers by checking out boundary conditions or by inspecting other aspects of certain suggested solutions, or by substituting numerical values and cutting out some answers. Since questions are varied, candidates will need a variety of techniques to cope with them.

In a multiple-choice examination, speed is an important factor. Candidates increase their chances of passing if they are able to seriously attempt each question on the entire paper at least once. It may help them to determine the proportionate number of questions to answer in the first half-hour of the examination, to check how much ground they cover in that time, and then accordingly either speed up, or slow down and dig more deeply.

When pressed for time, it may pay for candidates to omit a few multiple-choice questions which they expect to take more time than average, so as to have time for a larger number of more quickly-answered questions. For example, a cluster of questions may have a common introduction which a candidate does not readily grasp, in which case he or she might skip the entire cluster at a first attempt.

Candidates may find it helpful to keep a list of the number of the questions not answered so that they quickly can get an idea of how many they are omitting. This will allow the candidate to quickly return to these questions.

Essay Questions

The model response to the typical essay question is brief, less than one-half of a written page. Be concise—candidates do not need to answer in complete sentences when a well-composed outline format is more appropriate. Candidates should not waste time on obscure details. They should show that they have learned the relevant material and that they understand it. They should state the obvious, if it is part of the answer.

For questions which require candidates to work a numerical solution, candidates should take the time to set up the problem so that they document their understanding. They should set forth relevant equations or formulae, then enter appropriate values. They should lay out complicated calculations in tables which demonstrate their understanding of the correct solution.

Candidates should keep each answer relevant to the precise question being asked. They should make sure they first understand exactly what is wanted before they begin to answer a question. When they have written part or all of their answer, they should take another look at the question and make sure they have answered—not their own question—but the question as set on the examination page.

If candidates are asked to “discuss” a proposal, they should list all significant arguments both for and against it.

If a candidate believes that a question is ambiguous, or that it does not provide all the information necessary to answer the question, the candidate should state how he or she interprets the question and/or what assumptions are made to answer it.

Candidates should take time to write legibly, since examiners can only give credit for what they can read. They should try to “organize” their answer. Then, their main aim is to get down as much relevant material as they can.

There is no advantage to answering the questions in any particular order. Candidates may answer the questions in the order given if they wish. Alternatively, candidates can quickly read over the whole paper, warm up with whichever question comes easily to them, gradually work into the questions they find more challenging, and end on a question that they think can be answered readily even though, by that time, their energy and concentration may be falling off.

Note that since each question is graded separately, each answer must be self-contained. Candidates should not say, “Part of my answer to question 1 is found in my answer to question 3.”

It is important that candidates remember that they have limited time.

Final Mental Preparations

Olympic and professional athletes often vary their training schedules as a major contest approaches. They often ease up on endurance training, and shift their aim to sharpening their alertness, their effectiveness, and their will to win.

In any examination, it is just as important that candidates be alert and effective, with all their wits about them, and with an eager desire to do their best.

Some candidates fail in the first half-hour or so of an examination. Perhaps it would be more accurate to say they “defeat themselves” in that time. They become pessimistic and discouraged, and think too much about the possibility of their having made a bad start in answering the questions.

Other candidates, with the same ability, knowledge, and preparation—and making bungles just as bad in parts of the examination as the first type of candidates—nevertheless succeed in passing the same examination. As in life itself it is also true of actuarial examinations, the difference between failure and success is often linked to a person’s attitude. Confidence and optimism, based on mastery of the subject through hard work and many hours of study, will help a candidate to keep going.

Instead of wasting time and energy worrying about how badly they believe they are doing, candidates should do something constructive on another question. They can always come back later to the weak answer, time permitting.

Candidates should never give up in the examination room. They should use every minute and every second of the available time. They should not “grade their own papers,” and decide not to hand in an answer to a question or two because they feel it is all wrong. They should hand in all of their answers, and let the examiners do the grading. At least one candidate has not handed in some answer pages which he or she had condemned in his or her own mind, only to find out later that the work was correct, and to find out still later that he or she had narrowly failed to pass.

Books to Read

Some candidates may find it a good investment of their time to read one or more books discussing study and examination techniques. On the other hand, many candidates have successfully completed all their examinations without reference to such texts. These texts will be of little value to a candidate with solid study habits. For those candidates who have not

them on certain points, such as on the most desirable level of the extensiveness of the notes a candidate should take. It is important for candidates to not chop and change from one technique to another during the time they are studying. Rather, they should read such books as they wish, and decide for themselves a single, clear path to travel—and then stick to it.

STUDY RESOURCES

CAS Study Kits

Study Kits have been prepared for Exams 5-9 to provide candidates with readings that are part of the *Syllabus of Examinations*. Study Kits will be available on October 4, 1999. To order Study Kits, please use the form at the back of the *Syllabus*.

2000 Study Kits	Price	
	US\$	CAN\$
Exam 5	\$42	\$66
Exam 6	\$39	\$62
Exam 7-Canada	\$86	\$131
Exam 7-United States	\$45	\$71
Exam 8	\$30	\$48
Exam 9	\$37	\$59

Canadian residents must add 7% for GST; Virginia residents must add 4.5% sales tax. For deliveries outside the U.S. or Canada, add 50% of the total cost for shipping. Candidates should check the Study Kits for completeness (i.e., defective pages and/or omissions). **Please allow four to six weeks for delivery. NO RETURNS. NO REFUNDS.**

CAS E-Mail Study Groups

The CAS has available e-mail study groups for those preparing for CAS examinations. To join a study group, go to the following page on the CAS Web Site: <http://www.casact.org/students/studygroups.htm>. Those who do not have Web access can join a study group via e-mail by sending an e-mail to caslists@lists.casact.org. In the body of the message, type *join studygroup1*, *join studygroup2*, etc., as appropriate for the specific examination. (Specify *studygroup7C* or *studygroup7U*.) Candidates will receive an e-mail confirmation that they have been added to the study group list. All messages sent through the e-mail study groups are archived

CAS Library

The CAS Library has available for loan all the books marked with an "L" in this *Syllabus*. Candidates registered for CAS Examinations and all members of the CAS have access to the library facilities. The CAS Library is located at the CAS Office in Arlington, Virginia.

Books and manuals may be withdrawn from the Library for a period of one month without charge. In general, not more than two references may be in the hands of one borrower at a time. Requests must be in writing and must include the borrower's complete name, address, and telephone number. Address requests for books to:

Casualty Actuarial Society
Library Service
1100 North Glebe Road, Suite 600
Arlington, VA 22201-4798
Fax: (703) 276-3108
E-Mail: library@casact.org

The CAS Office ships the requested book(s) in the United States and Canada via United Parcel Service (UPS) and internationally via Air Mail. Due to delays in the mail system, the CAS requires all shipments of books returned to the CAS Office to be shipped via UPS or an equivalent carrier with tracking capabilities. Please do not use the United States Postal Service. Overdue books will be charged at a cost of 10¢ per day.

Books that are not available through the CAS Library may be obtained by contacting the organizations listed in the "Index to Text References" in this *Syllabus*.

Sample Examination Questions

Sample examination questions for Exams 1-4 are available in the Students' Corner of the CAS Web Site (www.casact.org).

Exams 5-9 will be available in the Students' Corner of the CAS Web Site approximately one week after all CAS-specific examinations have been completed. They will include a *preliminary* list of multiple-choice and true/false answers. Sample essay answers and final multiple-choice and true/false answers will be posted on July 31, 2000 for Spring Examinations and January 31, 2001 for Fall Examinations.

CAS-specific examinations with answers for the past two years are available under Study Tools in the Students' Corner of the CAS Web Site.

may not be considered perfect answers. **NOTE:** Because sample answers are not available until July 31, 2000 for Spring Examinations and January 31, 2001 for Fall Examinations, the three-year Set of Examinations will not be updated until after these dates. Please use the white order forms provided inside the back cover of the *Syllabus*. **NO RETURNS. NO REFUNDS.**

In referring to a published prior examination, candidates should keep in mind that the questions were based on the course of readings in effect for that particular examination and may not reflect the current course of readings. Candidates may also expect future examinations to vary somewhat as to the proportions of question styles and subjects. New forms of questions may appear from time to time, and the total number of questions may be increased or decreased.

CAS Publications

CAS publications that are still in print may be purchased at the prices listed below. Prices include postage and handling for orders delivered in the U.S. and Canada. For deliveries outside the U.S. or Canada, add 50% to prices shown below. Canadian residents must add 7% for GST. Virginia residents must add 4.5% sales tax. Bulk orders of 20 or more of any single publication will receive a 20% discount. Prepayment is required for all orders. Payment may be in U.S. or Canadian funds in the form of check, draft, or money order. Credit card payments (MasterCard, Visa, American Express, Diners Club, or Discover) will be processed in U.S. funds. Please use the white order form provided inside the back cover of the *Syllabus*. **Allow four to six weeks for delivery. NO RETURNS. NO REFUNDS.**

PUBLICATIONS	PRICES	
	US\$	CAN\$
<i>Proceedings of the Casualty Actuarial Society (PCAS)</i>		
Volume LXIX (1982)	\$50	\$78
Volume LXX (1983)	\$50	\$78
Volume LXXI (1984)	\$50	\$78
Volume LXXIII (1986)	\$50	\$78
Volume LXXIV (1987)	\$50	\$78
Volume LXXV (1988)	\$50	\$78
Volume LXXVI (1989)	\$50	\$78

PUBLICATIONS, Continued	PRICES	
	US\$	CAN\$
<i>Proceedings of the Casualty Actuarial Society (PCAS)</i>		
Volume LXXXIII (1996)	\$50	\$78
Volume LXXXIV (1997)	\$50	\$78
Volume LXXXV (1998)	\$50	\$78
<i>Index to the Literature of the Casualty Actuarial Society</i>		
Volumes XXXI to XL (1944-1953)	\$1	\$5
Volume XLI to L (See 1963 PCAS)	In the 1963 PCAS	
Volumes LI to LXXX (1964-1993)	\$30	\$48
Volumes LXXXI to LXXXV (1994-1998)	\$30	\$48
CAS 2000 Yearbook	\$40	\$63
<i>CAS Discussion Paper Programs</i>		
1984-Financial Solvency	\$30	\$48
1991-International Topics—Global Insurance Pricing, Reserving, and Coverage Issues	\$30	\$48
1993-The Actuary as Business Manager	\$30	\$48
1996-Alternative Markets/Self Insurance	\$30	\$48
1997-Health Care Issues for Property/Casualty Insurers	\$30	\$48
1998-Dynamic Analysis of Pricing Decisions	\$30	\$48
1999-Securitization of Risk	\$30	\$48
Casualty Actuarial Society <i>Forum</i> (per volume)	@ \$30	@ \$48
<input type="checkbox"/> Fall 1987	<input type="checkbox"/> Spring 1996	
<input type="checkbox"/> Fall 1988	<input type="checkbox"/> Summer 1996	
<input type="checkbox"/> Spring 1989	<input type="checkbox"/> Winter 1997	
<input type="checkbox"/> Fall 1989	<input type="checkbox"/> Spring 1997	
<input type="checkbox"/> Winter 1991	<input type="checkbox"/> Summer 1997 (Vol. 1)	
<input type="checkbox"/> Fall 1991	<input type="checkbox"/> Summer 1997 (Vol. 2)	
<input type="checkbox"/> Spring 1992	<input type="checkbox"/> Winter 1998	
<input type="checkbox"/> Winter 1993	<input type="checkbox"/> Summer 1998	
<input type="checkbox"/> Summer 1993	<input type="checkbox"/> Fall 1998	
<input type="checkbox"/> Winter 1994	<input type="checkbox"/> Winter 1999	

PUBLICATIONS, Continued	PRICES	
	US\$	CAN\$
<i>Foundations of Casualty Actuarial Science</i> (Third Ed.)	\$75	\$115
Statement of Principles Regarding P&C Insurance Ratemaking	\$4	\$10
Statement of Principles Regarding P&C Loss and Loss Adjustment Expense Reserves	\$4	\$10
Statement of Principles Regarding P&C Valuations	\$4	\$10

MATERIALS FOR STUDY

Introduction

The *Syllabus* presents material that casualty actuarial candidates should understand thoroughly and be able to apply professionally to actual casualty insurance situations. The examination process is designed to assure that each successful casualty actuarial candidate attains a satisfactory level of competence in the subject matter.

References to papers in the *Proceedings of the Casualty Actuarial Society (PCAS)* are considered to include all cited discussions of these papers, unless otherwise noted. In the case of readings from out-of-print *Proceedings* volumes, candidates are responsible only for those discussions reprinted in the Study Kits. [*Proceedings* for years that are still in print may be purchased from the CAS. Articles from the *CAS Proceedings, Forum, and Discussion Paper Program* that are out of print are included in the Study Kits.]

Information for ordering CAS Study Kits, sample examinations, and CAS publications, and for using the CAS Library, is provided in this *Syllabus* on pages 32-36.

A detailed identification of the text references can be found in the "Index to Text References" at the end of each section and at the end of the *Syllabus*. The suggested reading material is designed to acquaint candidates with the respective subjects and should not be interpreted as representing views endorsed by the CAS. Although the CAS Library has many of the *Syllabus* readings available for loan, there are still a few that must be obtained by contacting the organizations listed in the "Index to Text References."

If a new edition of any text becomes available after publication of this *Syllabus*, candidates should check "Update to the *Syllabus*" in the Students' Corner of the CAS Web Site (www.casact.org)—or contact the CAS Office—for instructions regarding its acceptability and the appropriate chapters/pages in the new edition that correspond to the published study requirements.

Key

L May be borrowed from the CAS Library.

SK Represents material included in the 2000 CAS Study Kit

Associateship Examinations

Exam 1 Mathematical Foundations of Actuarial Science

This three-hour multiple-choice examination is administered by Preliminary Actuarial Examinations and is identical to SoA Course 1.

The purpose of this examination is to enable the candidate to demonstrate a knowledge of the fundamental mathematical tools for quantitatively assessing risk. The application of these tools to problems encountered in actuarial science is emphasized. A thorough command of calculus and probability topics is assumed. Questions on the examination are presented primarily in the context of risk and insurance.

The tools emphasized on Exam 1 are:

- Limits, series, sequences and functions;
- Derivatives of single and multivariate functions (maximums, minimums, constrained maximums and minimums, rate of change);
- Integrals of single and multivariate functions, simple differential equations;
- Vector-valued functions (polar coordinates, parameterized curves);
- General probability (set functions, basic axioms, independence);
- Bayes' Theorem;
- Univariate probability distributions (probabilities, moments, variance, mode, percentiles, transformations); and
- Multivariate probability distributions (Central Limit Theorem; joint, conditional and marginal distributions—probabilities, moments, variance, covariance).

READINGS

The texts listed in Sections A and B below are considered representative of the many texts used by colleges and universities in Canada and the United States to cover material on which the candidate may be examined. Earlier

or later editions of the listed texts contain essentially the same material and should be adequate for review purposes. The candidate is expected to be familiar with the concepts introduced in the study note in Section C.

A. Calculus

Anton, H., *Calculus: A New Horizon* (Sixth Edition), 1998, John Wiley and Sons.

Edwards, C.H.; and Penney, D.E., *Calculus with Analytic Geometry* (Fifth Edition), 1997, Prentice-Hall.

Hughes-Hallett, D.; Gleason, A.M.; and McCallum, W.G., *Calculus: Single and Multivariable* (Second Edition), 1998, John Wiley and Sons.

Thomas, G.B.; and Finney, R.L., *Calculus and Analytic Geometry* (Ninth Edition), 1996, Addison-Wesley.

B. Probability

Ghahramani, S., *Fundamentals of Probability*, 1996, Prentice-Hall, Chapters 1-11.

Hassett, M.; and Stewart, D., *Probability for Risk Management*, 1999, ACTEX Publications, Chapters 1-11.

Hogg, R.V.; and Tanis, E.A., *Probability and Statistical Inference* (Fifth Edition), 1997, Prentice-Hall, Chapters 2-5, 11.

Ross, S.M., *A First Course in Probability* (Fifth Edition), 1998, Prentice-Hall, Chapters 1-8.

C. Risk and Insurance

Because some candidates may be unfamiliar with some of the business vocabulary used in the exam, a short study note will introduce basic concepts underlying risk and insurance. These concepts will not be tested directly, but will provide the context for some of the questions on the exam. [This study note will be available January 1, 2000.]

Index to Text References for Exam 1

The following information is furnished for those who wish to purchase the text references cited for Exam 1.

Actuarial Bookstore, P.O. Box 430, Somersworth, NH 03878; telephone: (800) 582-9672 or (603) 692-5598; fax: (603) 692-5597; Web site: www.actuarialbookstore.com.

Anton, H., *Calculus: A New Horizon* (Sixth Edition), 1998, John Wiley and Sons, One Wiley Drive, Somerset, NJ 08875; telephone: (800) 225-5945 or (732) 469-4400.

Edwards, C.H.; and Penney, D.E., *Calculus with Analytic Geometry* (Fifth Edition), 1997, Prentice-Hall, Inc.; telephone: (800) 374-1200 or (515) 284-6751.

Ghahramani, S., *Fundamentals of Probability*, 1996, Prentice-Hall, Inc.; telephone: (800) 374-1200 or (515) 284-6751.

Hassett, M.; and Stewart, D., *Probability for Risk Management*, 1999, ACTEX Publications, 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152, e-mail: retail@actexmadriver.com.

Hogg, R.V.; and Tanis, E.A., *Probability and Statistical Inference* (Fifth Edition), 1997, Prentice-Hall, Inc.; telephone: (800) 374-1200 or (515) 284-6751.

Hughes-Hallett, D.; Gleason, A.M.; and McCallum, W.G., *Calculus: Single and Multivariable* (Second Edition), 1998, John Wiley and Sons, One Wiley Drive, Somerset, NJ 08875; telephone: (800) 225-5945 or (732) 469-4400.

Mad River Books (A division of ACTEX Publications), 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152, e-mail: retail@actexmadriver.com.

Ross, S.M., *A First Course in Probability* (Fifth Edition), 1998, Prentice-Hall, Inc.; telephone: (800) 374-1200 or (515) 284-6751.

Study Note on Risk and Insurance, Society of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: www.soa.org.

Thomas, G.B.; and Finney, R.L., *Calculus and Analytic Geometry* (Ninth Edition), 1996, Addison-Wesley; telephone: (800) 922-0579.

Exam 2

Interest Theory, Economics, and Finance

This four-hour multiple-choice examination is administered by Preliminary Actuarial Examinations and is identical to SoA Course 2.

The purpose of this examination is to test the candidate's basic knowledge of economics and finance. Concepts from microeconomics and macroeconomics are fundamental to understanding the general business environment. Basic interest theory and finance are essential to understanding the business of insurance.

Specific readings are listed only to ensure a consistent understanding of the material to be covered. The intention is not to focus on one particular text.

A. Economics

Candidates should be able to use microeconomic principles to build models to increase their understanding of the framework of contingent events and to use as a framework for activities such as pricing. They should be able to use knowledge of microeconomic principles to increase their understanding of the markets in which we operate and of regulatory issues related to these markets. Candidates also should be able to use microeconomic principles to increase their understanding of the ramifications of strategic decisions.

Candidates should understand macroeconomic principles and be able to use them in developing economic models and/or economic assumptions. They should understand macroeconomic principles and how they relate to the business cycle.

READINGS

Landsburg, S.E., *Price Theory and Applications* (Fourth Edition), 1999, International Thompson Publishing. [Use the same chapters in the third edition.] Chapters: 1, Supply, Demand, and Equilibrium; 2, Prices, Costs and Gains from Trade; 3, Behavior of Consumers; 4, Consumers in Marketplace; 5, Behavior of Firms; 7, Competition; 8, Welfare Economics and Gain from Trade; 9, Knowledge and Information (9.3 only—Adverse Selection and Moral Hazard); 10, Monopoly; 11, Market Power, Collusion and Oligopoly; and 14, Common Property and Public Goods.

Wachtel, P., *Macroeconomics*, Society of Actuaries Study Note 220-28-97. Chapters: 1, Macroeconomic Measurement; 2, Real Sector Model; 3, Keynesian Model; 4, Total Supply and Demand Model; 5, Inflation; and 6, Banks, Money and Monetary Policy.

B. Interest Theory and Finance

Candidates should have practical knowledge of the theory of interest in both finite and continuous time, know how these concepts are used in the various annuity functions, and be able to apply the concepts of present and accumulated value for various streams of cash flows as a basis for future use in reserving, valuation, pricing, duration, asset/liability management, investment income, capital budgeting, and contingencies. They should also be able to do present and accumulated value calculations using non-level interest rates.

Candidates should understand and be able to analyze financial statements including balance sheets, income statements, and statements of cash flow. They should be able to assess financial performance using net present value and using the payback, discounted payback, internal rate of return, and profitability index models. Candidates should be able to analyze statements to identify what should be discounted, what other factors should be considered, and the possible interactions between models. Candidates should understand the trade-off between risk and return. Candidates should understand the implications of the efficient market theory for the valuation of securities. They should understand and be able to analyze financial performance by evaluating financial statements and financial ratios such as leverage, liquidity, profitability, market value ratios and analysis of accounting return versus economic return. Candidates should understand the basic principles of option pricing theory.

READINGS

Kellison, S., *Theory of Interest*, 1991, Irwin/McGraw-Hill, Chapters: 1, Measurement of Interest; 2, Solution of Problems in Interest; 3, Basic Annuities (excluding 3.6, 3.7, 3.10); 4, More General Annuities; 5, Yield Rates (excluding 5.7-5.9); 6, Amortization Schedules and Sinking Funds (excluding 6.7, 6.8); and 7, Bonds and Other Securities (7.3 and 7.4 only).

Brealey, R.A.; and Myers, S.C., *Principles of Corporate Finance* (Fifth Edition), 1996, McGraw-Hill, Chapters: 1, Why Finance Matters; 4, The Value of Common Stocks; 5, Why

Criteria; 6, Making Investment Decisions with the Net Present Value Rule; 7, Introduction to Risk, Return and the Opportunity Cost of Capital; 8, Risk and Return; 9, Capital Budgeting and Risk; 10, A Project is Not a Black Box; 11, Where Positive Net Present Values Come From; 12, Organizing Capital Expenditure and Evaluating Performance Afterward; 13, Corporate Financing and the Six Lessons of Market Efficiency; 14, An Overview of Corporate Financing; 15, How Corporations Issue Securities; 16, The Dividend Controversy; 17, Does Debt Policy Matter?; 18, How Much Should a Firm Borrow?; 19, Interactions of Investment and Financing Decisions; 20, Corporate Liabilities and the Valuation of Options; 21, Applications of Option Pricing Theory; and 27, Analyzing Financial Performance.

Alternate texts may be used for finance (*Corporate Finance* by S.A. Ross, R.W. Westerfield, and J. Jaffe and *Financial Management* by E.F. Brigham and L.C. Gapenski) and interest theory (*Mathematics of Investment and Credit* by S.A. Broverman and *The Theory of Interest and Life Contingencies with Pension Applications: A Problem-Solving Approach* by M.M. Parmenter).

Index to Text References for Exam 2

The following information is furnished for those who wish to purchase the text references cited for Exam 2.

Actuarial Bookstore, P.O. Box 430, Somersworth, NH 03878; telephone: (800) 582-9672 or (603) 692-5598; fax: (603) 692-5597; Web site: www.actuarialbookstore.com.

Brealey, R.A.; and Myers, S.C., *Principles of Corporate Finance* (Fifth Edition), 1996, McGraw-Hill, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.

Brigham, E.F.; and Gapenski, L.C., *Financial Management* (Ninth Edition), 1998, Harcourt Brace College Publishers, 6277 Sea Harbor Drive, Orlando, FL 32887; telephone (800) 245-8744.

Broverman, S.A., *Mathematics of Investment and Credit* (Second Edition), 1996, Mad River Books (A division of ACTEX Publications), 140 Willow Street, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; e-mail: retail@actexamdriver.com.

Kellison, S.G., *Theory of Interest*, 1991, Irwin/McGraw-Hill, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.

Landsburg, S.E., *Price Theory and Applications* (Fourth Edition), 1999, International Thompson Publishing, Order Department, P.O. Box 6904, Florence, KY 41022; telephone: (800) 347-7707.

Mad River Books (A division of ACTEX Publications), 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152, e-mail: retail@actexamdriver.com.

Parmenter, M.M., *The Theory of Interest and Life Contingencies with Pension Applications: A Problem-Solving Approach* (Revised Edition), Mad River Books (A division of ACTEX Publications), 140 Willow Street, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; e-mail: retail@actexamdriver.com.

Ross, S.A.; Westerfield, R.W.; and Jaffe, J., *Corporate Finance* (Fourth Edition), 1996, McGraw-Hill Inc., 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.

Wachtel, P., *Macroeconomics*, SoA Study Note 220-28-97, Society of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: www.soa.org.

Exam 3

Actuarial Models

This four-hour multiple-choice examination is administered by Preliminary Actuarial Examinations and is identical to SoA Course 3.

This examination covers the candidate's knowledge of the theoretical basis of actuarial models and the application of those models to insurance and other financial risks. A thorough knowledge of calculus, probability, and interest theory is assumed. A knowledge of risk and insurance at the level of Exam 1 is also assumed. The candidate will be required to understand, in an actuarial context, what is meant by the word "model," how and why models are used, their advantages, and their limitations. The candidate is expected to understand the models and techniques covered in this *Syllabus*, and to be able to apply the models to solve problems set in a business context. The effects of regulations, laws, accounting practices, and competition on the results produced by the models are beyond the scope of this examination.

Five textbooks are recommended for this examination. Three of them will also be used for Exam 4. In addition, one article will be tested, and a study note introducing the candidate to models and modeling is expected to be available. The texts are: *Actuarial Mathematics* by N.L. Bowers, H.U. Gerber, J.C. Hickman, D.A. Jones, and C.J. Nesbitt (1997); *Survival Analysis* by J.P. Klein and M.L. Moeschberger (1997); *Loss Models: From Data to Decisions* by S.A. Klugman, H.H. Panjer, and G.E. Willmot (1998); *Introduction to Probability Models* by S.M. Ross (1997); and *Simulation* by S.M. Ross (1997).

A. Classification of Models

Candidates should understand the differences among the models and the methods, and recognize the underlying similarities. Candidates also should be able to explain the difference between a stochastic and a deterministic model and identify the advantages and disadvantages of each.

READINGS

Study Note: A study note is being prepared, but is not yet final. When it becomes available, the CAS will notify candidates (see the Students' Corner of the CAS Web Site at www.casact.org).

B. Contingent Payment Models

Candidates should be able to formulate and apply stochastic and deterministic models for the present value of a set of future contingent cash flows under an assumed interest rate structure. Candidates also should be able to apply the equivalence principle, and other principles in the text, to associate a cost or pattern of (possibly contingent) costs with a set of future contingent cash flows.

READINGS

Bowers, N.L.; Gerber, H.U.; Hickman, J.C.; Jones, D.A.; and Nesbitt, C.J., *Actuarial Mathematics* (Second Edition), 1997, Society of Actuaries, Chapter 4, Sections 5.1-5.4, 6.1-6.4, 7.1-7.6, Chapter 8, Sections 9.1-9.8, Chapter 10.

C. Survival Models

Candidates should be able to work with discrete and continuous univariate probability distributions for failure time random variables. They will be expected to set up and solve equations in terms of life table functions, cumulative distribution functions, survival functions, probability density functions, and hazard functions (e.g., force of mortality), as appropriate.

In addition, candidates should have similar facility with models of the joint distribution of two failure times (multiple lives) and the joint distribution of competing risks (multiple decrement).

READINGS

Bowers, N.L.; Gerber, H.U.; Hickman, J.C.; Jones, D.A.; and Nesbitt, C.J., *Actuarial Mathematics* (Second Edition), 1997, Society of Actuaries, Chapter 3.

Klein, J.P.; and Moeschberger, M.L., *Survival Analysis*, 1997, Springer-Verlag, New York, Chapters 2 and 3 (excluding 3.6).

D. Frequency and Severity Models

Candidates should be able to define frequency (counting) and severity distributions, and be able to use the parameters and moments of these distributions. Candidates also should be able to work with the families of distributions generated by algebraic manipulation and mixing of the basic distributions presented.

READINGS

Klugman, S.A.; Panjer, H.H.; and Willmot, G.E., *Loss Models: From Data to Decisions*, 1998, John Wiley and Sons, New York, Sections 1.3, 2.1, 2.2 (Definitions 2.10, 2.11, 2.12, 2.13 only), 2.6 (pp. 74-77, 83 only), 2.7 (excluding Example 2.51), 2.10 (excluding 2.10.1 and following), 3.1, 3.2.1-3.2.2, 3.3.1-3.3.2, 3.4.1, 3.5 (through first full paragraph on p. 222), 3.6.1, 3.7 (excluding 3.7.1 and 3.7.2), 3.9 (Example 3.29 only), 3.10.1 (excluding Example 3.34 and following), 3.10.2 (excluding Example 3.38 and following).

E. Compound Distribution Models

Candidates should be able to calculate the probabilities associated with a compound distribution when the compounding distribution is one of the frequency distributions presented in the syllabus, and the compounded distribution is discrete or a discretization of a continuous distribution. Candidates also should be able to adjust such probability calculations for the impact of policy modifications such as deductibles, policy limits and coinsurance.

READINGS

Klugman, S.A.; Panjer, H.H.; and Willmot, G.E., *Loss Models: From Data to Decisions*, 1998, John Wiley and Sons, New York, Sections 1.4, 4.1-4.3, 4.5-4.6 (excluding 4.6.5.2), 4.8, 4.9.4 (p. 336 only).

F. Stochastic Process Models

Candidates should learn to solve problems using stochastic processes. They also should learn how to determine the probabilities and distributions associated with these processes.

The following stochastic processes will be covered: Markov chain (discrete-time and continuous-time) processes, counting processes, Poisson process (including nonhomogeneous and compound Poisson processes), and Brownian motion.

READINGS

Ross, S.M., *Introduction to Probability Models* (Sixth Edition), 1997, Academic Press, San Diego, Sections 2.8, 4.1-4.4, 4.5.1, 4.6, 5.3-5.4, 6.1-6.5, 6.8, 10.1-10.4.

Jones, B.L., "Stochastic Models for Continuing Care Retirement Communities," *North American Actuarial Journal*, Volume 1, Number 1, pp. 50-64.

G. Ruin Models

Candidates should be able to analyze the probability of ruin using various models. Other topics covered in this section include the determination of the characteristics of the distribution of the amount of surplus (deficit) at the first time below the initial level and at the lowest level (maximal aggregate loss), and the impact of reinsurance.

READINGS

Bowers, N.L.; Gerber, H.U.; Hickman, J.C.; Jones, D.A.; and Nesbitt, C.J., *Actuarial Mathematics* (Second Edition), 1997, Society of Actuaries, Chapter 13 (excluding autoregressive discrete-time model and Appendix), Section 14.5.

Klugman, S.A.; Panjer, H.H.; and Willmot, G.E., *Loss Models: From Data to Decisions*, 1998, John Wiley and Sons, New York, Sections 6.2.3, 6.3.1, 6.3.2.1.

Notation: Some notation presented in Chapters 13 and 14 of *Actuarial Mathematics* is introduced in Chapter 12. Candidates may find it helpful to refer to Chapter 12 when studying the readings in Chapters 13 and 14.

H. Simulation of Models

Candidates should be able to generate discrete and continuous random variables using basic simulation methods. They also should be able to construct algorithms to simulate outcomes using stochastic models.

READINGS

Ross, S.M., *Simulation* (Second Edition), 1997, Academic Press, San Diego, Sections 3.1, 4.1-4.3, Chapters 5 (excluding 5.3), 6.

Index to Text References for Exam 3

The following information is furnished for those who wish to purchase the text references cited for Exam 3.

Actuarial Bookstore, P.O. Box 430, Somersworth, NH 03878; telephone: (800) 582-9672 or (603) 692-5598; fax: (603) 692-5597; Web site: www.actuarialbookstore.com.

Bowers, N.L.; Gerber, H.U.; Hickman, J.C.; Jones, D.A.; and Nesbitt, C.J., *Actuarial Mathematics* (Second Edition), 1997, Society of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: www.soa.org.

Jones, B.L., "Stochastic Models for Continuing Care Retirement Communities," *North American Actuarial Journal*, Volume 1, Number 1, Society of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: www.soa.org.

Klein, J.P.; and Moeschberger, M.L., *Survival Analysis*, 1997, Springer-Verlag New York, Inc., P.O. Box 2485, Secaucus, NJ 07096-2485; telephone: (800) 777-4643; fax: (201) 348-4505.

Klugman, S.A.; Panjer, H.H.; and Willmot, G.E., *Loss Models: From Data to Decisions*, 1998, John Wiley and Sons, One Wiley Drive, Somerset, NJ 08875; telephone: (800) 225-5945 or (732) 469-4400.

Mad River Books (A division of ACTEX Publications), 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152, e-mail: retail@actexamdriver.com.

Ross, S.M., *Introduction to Probability Models* (Sixth Edition), 1997, Academic Press, 6277 Sea Harbor Drive, Attn: Customer Service (Fifth Floor), Orlando, FL 32887; telephone: (407) 345-3800.

Ross, S.M., *Simulation* (Second Edition), 1997, Academic Press, 6277 Sea Harbor Drive, Attn: Customer Service (Fifth Floor), Orlando, FL 32887; telephone: (407) 345-3800.

Exam 4 Actuarial Modeling

This four-hour multiple-choice examination is administered by Preliminary Actuarial Examinations and is identical to SoA Course 4.

This examination provides an introduction to modeling and covers important actuarial and statistical methods that are useful in modeling. A thorough knowledge of calculus, linear algebra, probability and mathematical statistics is assumed. The candidate will be required to understand the steps involved in the modeling process and how to carry out these steps in solving business problems. The candidate will be introduced to a variety of tools for the calibration and evaluation of the models on Exam 3.

Four textbooks are recommended for this examination. In addition, a study note introducing the candidate to models and modeling is expected to be available. The texts are: *Survival Analysis* by J.P. Klein and M.L. Moeschberger (1997); *Loss Models: From Data to Decisions* by S.A. Klugman, H.H. Panjer, and G.E. Willmot (1998); *Econometric Models and Economic Forecasts* by R.S. Pindyck and D.L. Rubinfeld (1998); and *Simulation* by S.M. Ross (1997).

A. The Modeling Process

Candidates should be able to identify steps in the modeling process as well as understand specific methods, models, underlying assumptions, and limitations imposed by the data.

READINGS

Study Note: A study note is being prepared, but is not yet final. When it becomes available, the CAS will notify candidates (see the Students' Corner of the CAS Web Site at www.casact.org).

B. Estimation and Fitting of Models

Candidates should be able to construct models and estimate model parameters using the models and methods contained in the readings. Sample data used for estimation may be complete, incomplete, censored, truncated, grouped, or shifted. Ability to apply tests to determine the acceptability of a model will also be required.

READINGS

Klein, J.P.; and Moeschberger, M.L., *Survival Analysis*, 1997, Springer-Verlag, New York, Chapters 4, 5, 6, Sections 7.1-7.3, Chapter 8, Sections 12.1-12.4.

Klugman, S.A.; Panjer, H.H.; and Willmot, G.E., *Loss Models: From Data to Decisions*, 1998, John Wiley and Sons, New York, Sections 2.2-2.6, 2.8-2.10, 3.2.3, 3.3.3-3.3.4, 3.4.2, 3.5, 3.10.1 (beginning with Example 3.34).

C. Regression, Forecasting, and Time Series

Candidates should be able to understand the basics of regression analysis, time series analysis, and forecasting. Candidates will be required to estimate model parameters, perform various tests of the model to determine its acceptability, and generate forecasts using the model (with a confidence interval).

READINGS

Pindyck, R.S.; and Rubinfeld, D.L., *Econometric Models and Economic Forecasts* (Fourth Edition), 1998, Irwin McGraw-Hill, Boston, Chapters 3-7, 15-18.

D. Credibility Theory

Candidates should have a thorough understanding of credibility theory and concepts contained in the readings. Knowledge of limited fluctuation credibility, Bayesian and empirical Bayesian methods, Bulmann and Buhlmann-Straub credibility is required.

READINGS

Klugman, S.A.; Panjer, H.H.; and Willmot, G.E., *Loss Models: From Data to Decisions*, 1998, John Wiley and Sons, New York, Sections 1.5, 5.1-5.5 (excluding 5.4.6 and 5.5.3).

E. Simulation in Estimation and Fitting

Candidates should be able to apply simulation methods as presented in the readings to areas such as estimating a quantity, determining an estimate's variability, and validating a model.

READINGS

Ross, S.M., *Simulation* (Second Edition), 1997, Academic Press, San Diego, Chapters 7 and 9.

Index to Text References for Exam 4

The following information is furnished for those who wish to purchase the text references cited for Exam 4.

Actuarial Bookstore, P.O. Box 430, Somersworth, NH 03878; telephone: (800) 582-9672 or (603) 692-5598; fax: (603) 692-5597; Web site: www.actuarialbookstore.com.

Klein, J.P.; and Moeschberger, M.L., *Survival Analysis*, 1997, Springer-Verlag New York, Inc., P.O. Box 2485, Secaucus, NJ 07096-2485; telephone: (800) 777-4643; fax: (201) 348-4505.

Klugman, S.A.; Panjer, H.H.; and Willmot, G.E., *Loss Models: From Data to Decisions*, 1998, John Wiley and Sons, One Wiley Drive, Somerset, NJ 08875; telephone: (800) 225-5945 or (732) 469-4400.

Mad River Books (A division of ACTEX Publications), 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152, e-mail: retail@actexmadrivern.com.

Pindyck, R.S.; and Rubinfeld, D.L., *Econometric Models and Economic Forecasts* (Fourth Edition), 1998, Irwin McGraw-Hill, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.

Ross, S.M., *Simulation* (Second Edition), 1997, Academic Press, 6277 Sea Harbor Drive, Attn: Customer Service (Fifth Floor), Orlando, FL 32887; telephone: (407) 345-3800.

Exam 5

Introduction to Property and Casualty Insurance and Ratemaking

Prior to commencing study for this four-hour examination, candidates should read the introduction and key to "Materials for Study" on page 37 of this *Syllabus*. Items marked with a bold **SK** constitute the 2000 CAS Exam 5 Study Kit that is available from the CAS Office for a cost of \$42 (\$66 Canadian).

The CAS will test the candidate's knowledge of the material, but may decide not to include questions from every reading on a particular exam.

A. Introduction to Property and Casualty Insurance

The insurance policy is a contract describing the services and protection that an insurer provides to an insured. It is, in effect, the only "product" the insurance buyer receives until a loss occurs. Because actuaries will be pricing this "product," it is essential that they have an understanding of what the product includes. Also, as the contract is amended, either by choice or by legislative or judicial activity, an actuary will be called on to evaluate the effect these changes will have on the cost of providing the coverage. Therefore, in studying the policy forms, the candidate should develop an understanding of the nature of the coverages provided and the exposure bases used in the respective lines of insurance.

Candidates should develop skills in reading and interpreting the policies they will be pricing or for which they will be developing reserves. The policies in these readings should be viewed as representative of broad categories of property and casualty policies. Candidates will be expected to understand the various parts of the policies, as well as be familiar with typical policy provisions, such as coverages, conditions, exclusions, limitations, duties, etc. The manual excerpts should be studied as illustrative of the part that manuals play in the forms, coverages, and rating process.

The other major topic covered in this section of the exam is insurance company operations. This is broken down into several key areas including company organization, marketing and distributions systems, underwriting, and claims.

Actuaries get involved in many aspects of marketing including product design and modification, as it relates to pricing and market research.

Candidates should be well versed in the responsibilities of the marketing function, as well as the basic differences among distribution systems for insurance products.

Underwriting is a key function of the insurance business, and it is critical to the success of the insurance endeavor. Actuaries work closely with underwriters to ensure that the prices reflect the goals of the underwriting process. As a result, candidates should have a thorough understanding of the underwriting function including purpose, principles, and activities.

The claims settlement process determines the value of losses that the actuary uses for both ratemaking and reserving. Candidates should know how claims are settled in terms of relevant policy provisions and the impact on overall loss levels.

Much of the material in this section is from the readings for the CPCU examinations. For more information about CPCU examinations, contact the American Institute for Chartered Property and Casualty Underwriters at (800) 644-2101.

READINGS

- SK** Wiening, E.A.; and Malecki, D.S., *Insurance Contract Analysis* (First Edition), American Institute for Chartered Property Casualty Underwriters, 1992, pp. 4-30, 37-74, 83-91, and 373-382.
- L** Hamilton, K.L.; and Malecki, D.S., *Personal Insurance: Property and Liability* (Second Edition), American Institute for Chartered Property Casualty Underwriters, 1999, pp. 17-41, 45-66, 75-96, 205-250, 267-295.
- SK** Malecki, D.S.; and Flitner, A.L., *Commercial Liability Insurance and Risk Management* (Fourth Edition), American Institute for Chartered Property Casualty Underwriters, 1998, Volume 1, pp. 1-33, 71-123.
- SK** Malecki, D.S.; Horn, R.C.; Wiening, E.A.; and Flitner, A.L., *Commercial Liability Insurance and Risk Management* (Third Edition), American Institute for Chartered Property Casualty Underwriters, 1996, Volume 2, pp. 1-60, 167-180.
- SK** Trupin, J.; and Flitner, A.L., *Commercial Property Insurance and Risk Management* (Fifth Edition), American Institute for Chartered Property Casualty Underwriters, 1998, Volume 1, pp. 101-122.

- SK Hallman, G.V.; and Hamilton, K.L., *Personal Insurance: Life, Health, and Retirement* (First Edition), 1994, American Institute for Chartered Property Casualty Underwriters, pp. 1-22.
- SK Health Insurance Association of America, *Group Life and Health Insurance—Part C* (Third Edition), 1992, Chapter 2, pp. 11-33.
- L Webb, B.L.; Harrison, C.M.; and Markham, J.J., *Insurance Operations* (Second Edition), American Institute for Chartered Property Casualty Underwriters, 1997, Volume 1, pp. 1-19, 39-62, 81-170.
- SK Webb, B.L.; Harrison, C.M.; and Markham, J.J., *Insurance Operations* (Second Edition), American Institute for Chartered Property Casualty Underwriters, 1997, Volume 2, pp. 109-111 (up to Summary), 199-246.
- SK Insurance Services Office, Inc., *Personal Automobile Policy* (Edition 6-94).
- SK Insurance Services Office, Inc., *Personal Automobile Manual* (Effective 6-94), General Rules 1-6.

B. Ratemaking

This section contains readings that describe ratemaking concepts in broad, general principles, as well as in specific detail. Certain general subjects of particular importance, such as credibility theory, classification, individual risk ratemaking, trend, loss development, and increased limits ratemaking among others, are addressed in separate papers. Issues specific to individual lines are also presented as illustrations of the applications of general principles.

Candidates should have a thorough understanding of the basic principles of ratemaking, such that they can analyze data, select an appropriate technique, and develop a solution to a numerical problem. In addition, candidates should be familiar with the more specific ratemaking techniques presented in the readings, and should be able to compare the relative advantages and disadvantages. Candidates should be able to discuss why certain procedures are applicable to individual lines of business and specific situations, as well as work problems using those techniques.

Candidates should be prepared to discuss the impact of changes in the economic environment on the pricing of insurance.

Candidates are not responsible for current, specific developments in ratemaking procedures outside of the readings in this section.

The following list of topics is typical, although not necessarily all inclusive, of those that candidates should be prepared to discuss:

- The selection and evaluation of ratemaking techniques corresponding to the characteristics of a given line of business.
 1. Pure premium compared to loss ratio method.
 2. Calendar year compared to accident year vs. policy year.
 3. Credibility and its complement.
 4. Territorial and risk classification relativities.
 5. Underwriting expense and profit considerations.
 6. Special adjustments to losses.
- Methods for trending and projecting losses and premiums.
 1. Internal compared to external indices.
 2. Relation to loss development.
 3. Claim cost projection compared to current cost index approach.
 4. Impact of deductibles, coinsurance, and insurance-to-value programs.
- Other special topics covered by the readings may be tested, including the application of ratemaking principles to problems that may not have generally recognized solutions.

Finally, this section includes readings that cover the planning and use of internal statistical information, and the compilation and presentation of insurance statistics for statistical reporting and ratemaking purposes. Candidates should be familiar with the kinds of data captured in the data collection plans discussed. They should also be able to compare the different plans, and note the links to the various ratemaking techniques.

READINGS

- L McClenahan, C.L., "Ratemaking," *Foundations of Casualty Actuarial Science* (Third Edition), Casualty Actuarial Society, 1996, Chapter 2, pp. 25-90.

- L Finger, R.J., "Risk Classification," *Foundations of Casualty Actuarial Science* (Third Edition), Casualty Actuarial Society, 1996, Chapter 5, pp. 233-281.
- SK Committee on Ratemaking Principles, *Statement of Principles Regarding Property and Casualty Insurance Ratemaking*, Casualty Actuarial Society.
- SK Bouska, A.S., "Exposure Bases Revisited," CAS Study Note.
- SK Boor, J.A., "The Complement of Credibility," *Casualty Actuarial Society Forum*, Fall 1995, pp. 323-354. Examination questions will not be based directly on Appendices A, B, and C, which were included in this study note for completeness.
- SK Study Kit Reading: Head, G.L., *Insurance to Value*, Chapters 1, 2, 6, and 7, and Appendices 1-4. (Reproduced with permission of the Huebner Foundation).
- SK Kelley, R., "Homeowners Insurance to Value—An Update," *Casualty Actuarial Society Forum* including the Ratemaking Call Papers, 1994, pp. 529-562.
- SK Burger, G.; Fitzgerald, B.; Woods, P.; and White, J., "Incorporating a Hurricane Model into Property Ratemaking," Study Note, omitting pages 42-53. Examination questions will not be based directly on the Appendix and Glossary, which were included in this study note for completeness.
- SK Feldblum, S., "Personal Automobile Premiums: An Asset Share Pricing Approach for Property-Casualty Insurance," *PCAS LXXXIII*, 1996, pp. 190-256 (excluding Sections 7-9).
- SK Feldblum, S., "Workers' Compensation Ratemaking," CAS Study Note, September 1993. Examination questions will not be based directly on the appendices, which were included in this study note for completeness.
- SK Graves, N.; and Castillo, R., "Commercial General Liability Insurance Ratemaking for Premises and Operations," *Pricing Issues*, Casualty Actuarial Society *Discussion Paper Program*, 1990, Volume II, pp. 631-696 (excluding section on Minimum Bias Procedures, pp. 673-681).
- SK Lange, J.T., "The Interpretation of Liability Increased Limits Statistics," *PCAS LVI*, 1969, pp. 163-173.
- SK Brown, B.Z.; and Schmitz, M.C., "Study Note Reading on Deductibles," CAS Study Note, 1998.
- SK Marker, J.O.; and Mohl, J.J., "Rating Claims-Made Insurance Policies," *Pricing Property and Casualty Insurance Products*, Casualty Actuarial Society *Discussion Paper Program*, 1980, pp. 265-304. Including discussion of paper: McManus, M.F., pp. 305-322.
- L Tiller, M.W., "Individual Risk Rating," *Foundations of Casualty Actuarial Science* (Third Edition), Casualty Actuarial Society, 1996, Chapter 3, pp. 91-141.
- SK Tiller, M.W., "Individual Risk Rating," CAS Study Note.
- SK Schofield, D., "Going From a Pure Premium to a Rate," CAS Study Note, 1998.
- SK Boor, J., "A Macroeconomic View of the Insurance Marketplace," CAS Study Note, 1998
- SK Boor, J., "The Impact of the Insurance Economic Cycle on Insurance Pricing," CAS Study Note, 1998.
- SK "Group Medical/Dental Benefit Pricing," CAS Study Note, pp. 1-23.
- SK Actuarial Standards Board of the American Academy of Actuaries, "Actuarial Standard of Practice No. 13, Trending Procedures in Property/Casualty Insurance Ratemaking."
- SK Prevosto, V.R., "Study Note: ISO Statistical Plans," CAS Study Note.
- SK Moncher, R.B., "Study Note: NCCI Data Collection Calls and Statistical Plans," CAS Study Note. Examination questions will not be taken from the history section that was included to emphasize the changing nature of data collection activities over time.

Index to Text References for Exam 5

The following information is furnished for those who wish to purchase the text references cited for Exam 5.

Actuarial Bookstore, P.O. Box 430, Somersworth, NH 03878;
telephone: (800) 582-9672 or (603) 692-5598; fax: (603) 692-

Actuarial Standards Board, American Academy of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173; telephone: (847) 706-3513; fax: (847) 706-3599.

American Institute for Chartered Property Casualty Underwriters, Order Department: P.O. Box 3016, 720 Providence Road, Malvern, PA 19355-0716; telephone: (610) 644-2100; fax: (610) 640-9576.

Casualty Actuarial Society *Forum*, *Foundations of Casualty Actuarial Science* (Third Edition), *PCAS*, and *Discussion Paper Program*, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.

Foundations of Casualty Actuarial Science (Third Edition), 1996, Casualty Actuarial Society, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org.

Head, G.L., *Insurance to Value*, Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, IL 60430.

Health Insurance Association of America, *Group Life and Health Insurance—Part C* (Third Edition), 1992, HIAA Distribution Center, 9050 Junction Drive, Annapolis, MD 20701; telephone: (800) 828-0111 or (301) 317-4422; fax: (301) 206-9789; Web site: www.hiaa.org.

Insurance Services Office, 7 World Trade Center, New York, NY 10048; telephone: (800) 888-4476.

Mad River Books (A division of ACTEX Publications), 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152, e-mail: retail@actexamdriver.com.

Exam 6 Reserving, Insurance Accounting Principles, and Reinsurance

Prior to commencing study for this four-hour examination, candidates should read the introduction and key to “Materials for Study” on page 37 of this *Syllabus*. Items marked with a bold **SK** constitute the 2000 CAS Exam 6 Study Kit that is available from the CAS Office for a cost of \$39 (\$62 Canadian).

The CAS will test the candidate’s knowledge of the material, but may decide not to include questions from every reading on a particular exam.

A. Reserving Techniques

An actuary may be expected to establish and review actuarial reserves, whether these are established by an insurance entity or by a non-insurance entity that is retaining risk. Candidates should be prepared to discuss such topics as:

1. The selection and evaluation of a loss reserving method appropriate to a given line of insurance:
 - a. For known claims;
 - b. For IBNR claims; and
 - c. For all incurred claims.
2. Testing of adequacy of previous loss and loss expense reserve levels.
3. Evaluating the adequacy of current loss expense reserve levels.
4. The identification of, and correction for, effects on loss reserves stemming from:
 - a. Changes in the loss climate;
 - b. Changes in a company’s handling of claims; and
 - c. Data problems.
5. Special reserving situations in a line arising from:
 - a. Catastrophe losses;
 - b. Reopened claims;

- c. Policies on a claims-made rather than occurrence basis;
 - d. Excess loss reserves; and
 - e. Discounting loss reserves.
6. The unearned premium reserve:
- a. Improving its accuracy;
 - b. The reserve for retrospective returns;
 - c. Policies on a claims-made basis; and
 - d. Deposit premium policies.
7. Allocated loss expense reserves.
8. Unallocated loss expense reserves.
9. Statutory Annual Statement reserves.

READINGS

- L Wisner, R.F., "Loss Reserving," *Foundations of Casualty Actuarial Science* (Third Edition), Casualty Actuarial Society, 1996, Chapter 4, pp. 143-232.
- SK Brosius, E., "Loss Development Using Credibility," March 1993.
- SK Fisher, W.H.; and Lange, J.T., "Loss Reserve Testing: A Report Year Approach," *PCAS LX*, 1973, pp. 189-207. Including discussions of paper: Skurnick, D., *PCAS LXI*, 1974, pp. 73-83; Author's response, *PCAS LXI*, 1974, pp. 84-85.
- SK Bornhuetter, R.L.; and Ferguson, R.E., "The Actuary and IBNR," *PCAS LIX*, 1972, pp. 181-195. Including discussions of paper: Cooper, W.P., *PCAS LX*, 1973, pp. 161-164; White, H.G., *PCAS LX* 1973, pp. 165-168.
- SK Bouska, A.S.; and McIntyre, T.S., "Measurement of U.S. Pollution Liabilities," *Casualty Actuarial Society Forum*, Summer 1994 Edition, pp. 73-160. Candidates will not be held responsible for material in appendices E through H.
- SK Adler, M.; and Kline, C.D. Jr., "Evaluating Bodily Injury Liabilities Using a Claims Closure Model," *Evaluating Insurance Company Liabilities*, Casualty Actuarial Society Discussion Paper Program, 1988, pp. 1-66.
- SK Fisher, W.H.; and Lester, E.P., "Loss Reserve Testing in a Changing Environment," *PCAS LXII*, 1975, pp. 154-171.
- SK McClenahan, C.L., "A Mathematical Model for Loss Reserve Analysis," *PCAS LXII*, 1975, pp. 134-145. Including discussion of paper: Skurnick D., *PCAS LXIII*, 1976, pp. 125-127. Candidates will not be held responsible for notation or the development of the formulae in this paper.
- SK Berquist, J.R.; and Sherman, R.E., "Loss Reserve Adequacy Testing: A Comprehensive, Systematic Approach," *PCAS LXIV*, 1977, pp. 123-184. Including discussion of paper: Thorne, J.O., *PCAS LXV*, 1978, pp. 10-33.
- SK Khury, C.K., "Loss Reserves: Performance Standards," *PCAS LXVII*, 1980, pp. 1-21. (Candidates will not be responsible for notation or development of the formulae in this paper.) Including discussion of paper: Berquist, J.R., *PCAS LXVII*, 1980, pp. 22-23.
- SK Stanard, J.N., "A Simulation Test of Prediction Errors of Loss Reserve Estimation Techniques," *PCAS LXXII*, 1985, pp. 124-148. Including discussion of paper: Robertson, J.P., *PCAS LXXII*, 1985, pp. 149-153; Peck, E.F., *PCAS LXXXII*, 1995, pp. 104-120.
- SK Pinto, E.; and Gogol, D.F., "An Analysis of Excess Loss Development," *PCAS LXXIV*, 1987, pp. 227-255. Including discussions of paper: Levine, G.M., *PCAS LXXIV*, 1987, pp. 256-271, and Bear, R.A., *PCAS LXXIX*, 1992, pp. 134-148.
- SK Siewert, J.J., "A Model for Reserving Workers Compensation High Deductibles," *Casualty Actuarial Society Forum*, Summer 1996, pp. 217-244.
- SK Berry, C.H., "A Method for Setting Retro Reserves," *PCAS LXVII*, 1980, pp. 226-238. Including discussion of paper: Morrell, R.K., *PCAS LXVIII*, 1981, pp. 107-110.
- SK Perkins, M.; and Teng, M.T.S., "Estimating the Premium Asset on Retrospectively Rated Policies," *PCAS LXXIII*, 1996, pp. 611-647.

- SK Linquanti, A.J., "Calculation of Unearned Premium Reserves on Interim Audited Risks—Monthly, Quarterly, and Semi-Annual Basis."
- SK Resony, A.V., "Allocated Loss Expense Reserves," *PCAS LIX*, 1972, pp. 141-149. Including discussion of paper: Petz, E.F., *PCAS LX*, 1973, pp. 157-160.
- SK Johnson, W.A., "Determination of Outstanding Liabilities for Unallocated Loss Adjustment Expenses," *PCAS LXXVI*, 1989, pp. 111-125. Corrections to Exhibits 2-5 are included.
- SK Kittel, J., "Unallocated Loss Adjustment Expense Reserves in an Inflationary Economic Environment," *Inflation Implications for Property-Casualty Insurance*, Casualty Actuarial Society Discussion Paper Program, 1981, pp. 311-331. Including discussion of paper: Bill, R., pp. 332-343.

B. Statement of Principles and Standards of Practice

Candidates should be familiar with the professional principles and standards of practice applicable to estimating and establishing loss and loss adjustment expense reserves.

READINGS

- SK Casualty Actuarial Society, *Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves*, May 1988.
- SK Actuarial Standards Board of American Academy of Actuaries, "Actuarial Standard of Practice No. 9, Documentation and Disclosure in Property and Casualty Insurance Ratemaking, Loss Reserving, and Valuations (Doc. No. 027)," 1991. Excluding Appendices 1 and 3.

C. Dynamic Financial Analysis

Candidates should have a conceptual knowledge of Dynamic Financial Analysis models and their application in evaluating balance sheet adequacy.

READINGS

- SK Warthen, T.V., III; Sommer, D.B., "Dynamic Financial Modeling—Issues and Approaches," *Casualty Actuarial Society Forum*, Spring 1996, pp. 291-328.

D. Insurance Accounting, Expense Analysis, and Published Financial Information

Candidates should obtain a general knowledge of insurance accounting, including its terminology and practice. Candidates should understand the details of, and reasons for, the differences between the accounting methods employed under statutory and Generally Accepted Accounting Principles (GAAP) accounting. Candidates should understand the differences between statistics included in these reports and those used for ratemaking and the various types of experience analysis. In addition, candidates should be able to interpret and evaluate data from the reports, identify potential distortions in the data, and suggest possible means of adjusting for any distortions.

READINGS

- L Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, Chapters 4, 6, 7, 11, and Appendix F (Glossary of Accounting Terms).
- SK Marshall, D.H.; McManus, W.W.; Kazenski, P.M.; and Scoles, K.N., Jr., *Accounting and Finance for Insurance Professionals* (First Edition), American Institute for Chartered Property Casualty Underwriters, 1997, Chapter 5, Chapter 11 (pp. 327 - 331, 350-358, 364-367). NOTE: Although other portions of the text will not specifically be tested, candidates may find this text to be useful as basic accounting background.
- SK Troxel, T.E.; and Bouchie, G.E., *Property-Liability Insurance Accounting and Finance* (Fourth Edition), American Institute for Chartered Property Casualty Underwriters, 1995, Chapter 2, Chapter 3 (pp. 126 - 131).
- SK Balcarek, R.J., "Effect of Loss Reserve Margins in Calendar Year Results," *PCAS LIII*, 1966, pp. 1-16. Including discussion of paper: Longley-Cook, L.H., *PCAS LIII*, 1966, pp. 17-18.

- SK Financial Accounting Standards Board, "Statement of Financial Accounting Standards No. 5—Accounting for Contingencies," Paragraphs 1-4, 8-11, 15, 40-45.
- SK Financial Accounting Standards Board, "Statement of Financial Accounting Standards No. 60—Accounting and Reporting by Insurance Enterprises," Paragraphs 1-9, 11, 13-14, 17-18, 20, 27-34, 38-41, 44, 60 a-h.
- L D'Arcy, S.P., "Special Issues—Data Sources," *Foundations of Casualty Actuarial Science* (Third Edition), Casualty Actuarial Society, 1996, Chapter 9, pp. 567-573.

E. Reinsurance

A key component of the insurance process is the sharing of risk between an insurer and a reinsurer. In this section, candidates should develop a thorough understanding of the types of reinsurance, the purposes of reinsurance, and how it is marketed and underwritten. Candidates should appreciate the unique characteristics of reinsurance, and how actuarial concepts such as pricing and reserving are adapted to apply to reinsurance.

Candidates should also understand the financial reporting issues and concepts that apply to reinsurance transactions.

READINGS

- L Elliott, M.W.; Webb, B.L.; Anderson, H.N.; and Kensicki, P.R., *Principles of Reinsurance*, Insurance Institute of America, 1995, Volume 1, Chapter 1, 2 (pp. 47-60), 3 (pp. 78-82), and 6.
- SK Elliott, M.W.; Webb, B.L.; Anderson, H.N.; and Kensicki, P.R., *Principles of Reinsurance*, Insurance Institute of America, 1995, Volume 2, pp. 107-113.
- L Reinartz, R.C.; Schloss, J.O.; Patrik, G.S.; and Kensicki, P.R., *Reinsurance Practices*, Insurance Institute of America, 1990, Volume I, Chapter 3; Volume II, Chapters 9, 10, and 11.
- SK Clark, D.R., "Basics of Reinsurance Pricing," CAS Study Note, 1996.

- SK Ludwig, S.J., "An Exposure Rating Approach to Pricing Property Excess-of-Loss Reinsurance," *PCAS LXXVIII*, 1991, pp. 110-145. Includes discussion: Feldblum, S., *PCAS LXXX*, 1993, pp. 380-395.
- L Patrik, G.S., "Reinsurance," *Foundations of Casualty Actuarial Science* (Third Edition), Casualty Actuarial Society, 1996, Chapter 6, pp. 338-368 (section on Reinsurance Loss Reserving).
- SK National Association of Insurance Commissioners, "Reinsurance," *Accounting Practices and Procedures Manual for Property/Casualty Companies*, 1994, Chapter 22.
- SK Financial Accounting Standards Board, "Statement of Financial Accounting Standards, No. 113, Accounting and Reporting for Reinsurance of Short-Duration and Long-Duration Contracts," December 1992, Summary, plus pp. 1-10 and 37-46. Appendices B and C are included as part of the formal reading from which questions may be taken. Candidates may find Appendix A helpful in preparing for this material; however, no questions will be taken directly from it.
- SK Steeneck, L., "Commutation of Claims," CAS Study Note, 1998.

Index to Text References for Exam 6

The following information is furnished for those who wish to purchase the text references cited for Exam 6.

Actuarial Bookstore, P.O. Box 430, Somersworth, NH 03878; telephone: (800) 582-9672 or (603) 692-5598; fax: (603) 692-5597; Web site: www.actuarialbookstore.com.

Actuarial Standards Board, American Academy of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173; telephone: (847) 706-3513; fax: (847) 706-3599.

American Institute for Chartered Property Casualty Underwriters, Order Department: P.O. Box 3016, 720 Providence Road, Malvern, PA 19355-0716; telephone: (610) 644-2100; fax: (610) 640-9576.

Casualty Actuarial Society *Forum*, *Foundations of Casualty Actuarial Science* (Third Edition), *PCAS*, and *Discussion Paper Program*, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.

Financial Accounting Standards Board, 401 Merret 7, P.O. Box 5116, Norwalk, CT 06856-5116; telephone: (203) 847-0700.

Foundations of Casualty Actuarial Science (Third Edition), 1996, Casualty Actuarial Society, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org.

Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, IASA Fulfillment Center, P.O. Box 51008, Durham, NC 27717; telephone: (800) 817-4272 or (919) 489-0991; fax: (800) 668-4272; Web site: www.iasa.org.

Insurance Institute of America, 720 Providence Road, Malvern, PA 19355-0716; telephone: (610) 644-2100; fax: (610) 640-9576.

Mad River Books (A division of ACTEX Publications), 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152, e-mail: retail@actexamdriver.com.

National Association of Insurance Commissioners, 120 W. 12th Street, #1100, Kansas City, MO 64105; telephone: (816) 842-3600.

Exam 7-Canada Nation-Specific Examination: Annual Statement, Taxation, and Regulation

Prior to commencing study for this four-hour examination, candidates should read the introduction and key to "Materials for Study" on page 37 of this *Syllabus*. Items marked with a bold SK constitute the 2000 CAS Exam 7-Canada Study Kit that is available from the CAS Office for a cost of \$86 (\$131 Canadian).

The CAS will test the candidate's knowledge of the material, but may decide not to include questions from every reading on a particular exam.

Section A of this examination includes a comprehensive presentation of Canadian tort law in the perspective of the insurance business in Canada. Section B focuses on insurance regulation and insurance contract law while Section C presents an overview of federal and provincial insurance programs. Finally, Section D covers finance and solvency issues. It includes insurance accounting and its relevant laws and regulations. It also deals with solvency monitoring systems such as the Dynamic Capital Adequacy Testing of the Canadian Institute of Actuaries. All sections are complemented, where appropriate, with information from other countries.

A. Background Law and Insurance

The legal foundation of tort law is a subject which is not strictly actuarial in nature, but which affects many areas of an actuary's work. Since no prior legal knowledge is assumed, this first section includes a comprehensive presentation of Canadian tort law including: functions of tort law, negligence, strict liability, products liability, government liability, occupiers liability, and damages and remedies. Candidates are also presented with material regarding recent changes and trends in American tort law. The Canadian and American material should provide background and a basic understanding of how tort law gives rise to the need for insurance.

READINGS

- L Linden, A.M., *Canadian Tort Law* (Sixth Edition) Student Edition (paperback), Butterworths, 1997, pp. 1-32, 97-112, 115-123, 125-146, 155-159, 227-231, 235-242, 271-279, 284-285, 298-301, 325-329, 345-346, 370-372, 453-455, 459-468, 476-481, 486-488, 494-497, 499-503, 511-522, 557-566, 570-584,

588-602, 610-623, 630-650. Candidates will be held responsible for the following cases: *Byrne v. Boadle* (Chapter 8); *Rylands v. Fletcher* (Chapter 14); *Donaghue v. Stevenson* (Chapter 16); and *Just v. British Columbia* (Chapter 17).

- SK Klar, L.N.; Linden, A.M.; Cherniak, E.A.; and Kryworuk, P.W., *Remedies in Tort*, Carswell, 1997 (Release 6), Volume 4, pp. 27-45 to 27-162.42. Candidates will not be tested on material included in "Additional Authorities" sections. However, candidates might find it helpful to read these sections for further clarification of concepts on which they will be tested. Candidates will not be responsible for text included in references. Candidates will not be responsible for any cases cited in this text.
- SK State of New York Advisory Commission on Liability Insurance, "Reform of the Tort Law," *Insuring Our Future*, Part Two, Section II, pp. 121-163.
- SK Hensler D.R.; Vaiana, M.E.; Kakalik, J.S.; and Peterson, M.A., *Trends in Tort Litigation, The Story Behind the Statistics*, Rand Institute for Civil Justice, 1987.

B. Regulation of Insurance

Candidates should understand the role of the insurance business as a supplier of an essential service. Because of the essential and highly technical nature of insurance, a system of regulatory controls has been established to require the industry to demonstrate that it is providing fair and reliable services in accordance with the statutes and regulations of the jurisdiction.

The material in this section presents the historical development of insurance regulation in Canada as well as the fundamentals of insurance regulation. This section also includes a comprehensive review of Canadian insurance contract law. Judicial decisions also impact insurance regulation to the extent they interpret the law and thereby modify regulatory behavior. Thus, candidates are presented with a number of Canadian cases that have contributed to the development of legal precedents.

Candidates are also provided with a broad overview of the history, objectives, and current issues surrounding rate regulation in the United States.

READINGS

- SK Baer, M.G.; and Rendall, J.A., *Cases on the Canadian Law of Insurance* (Fifth Edition), Carswell, 1995, pp. 23-28, 33-34, 36-44, 59-88 (excluding tables on pages 62-67), 90-97. Candidates will be held responsible for the following cases: *R. v. Anderson and Teskey*, *R. v. Parks*, *Gray v. Kerlake*; *Glenn v. Scottish Union and National Insurance Company Ltd.* (Chapter 1); and *Regal Films Corporation Ltd. v. Glens Falls Insurance Company* (Chapter 2).
- SK McDonald, B.R., *Life Insurance Laws of Canada (Common Law Provinces)*, Life Underwriters Association of Canada, 1995, pp. A1-1, A2-1 to A2-11, B1-1 to B1-2, B2-1 to B2-3, and B4-1 to B4-3. Candidates are responsible for all cases cited in this text.
- L Brown, C., *Canadian Insurance Contracts Law in a Nutshell*, Carswell, 1995 Edition, Chapters 1-3, 5, 6, 9, 11, 12 (Sections 5 and 6 only) and 13.
- SK Baer, M.G.; and Rendall, J.A., *Cases on the Canadian Law of Insurance* (Fifth Edition), Carswell, 1995, pp. 277-279, 423-426, 507-519, 742-748 and 750-752. Candidates will be held responsible for the following cases: *Berkowitz v. MPIC* (Chapter 7); *Fletcher v. MPIC* (Chapter 8); *Broadhurst & Ball v. American Home and Dillon v. Guardian Insurance* (Chapter 11).
- SK Zurich Insurance Company vs. Ontario Human Rights Code (C.D.P.), [1992] 2 R.C.S., pp. 321-328.
- L Ettlinger, K.H.; Hamilton, K.L.; and Krohm, G., *State Insurance Regulation* (First Edition), Insurance Institute of America, 1995, Chapter 4 (including Exhibits 4-1 and 4-3). Candidates will not be tested on material that appears only in the exhibits unless the exhibit is specifically identified in the *Syllabus*.

C. Government Plans

This section begins with coverages provided by federal government insurance plans. Candidates are expected to be familiar with the basic principles and concepts underlying Canadian Employment Insurance and the Canadian pension programs. Candidates are not expected to have detailed knowledge of the current levels of benefits or the formulae used to calculate such benefits. This section also includes material regarding

environmental liabilities in the United States (Superfund) and on Canadian earthquake guidelines.

The second part of this section addresses provincial insurance plans. Candidates are responsible for a general understanding of Canadian provincial health plans. An understanding of the regulatory environment surrounding U.S. workers' compensation is also required. In the statutory automobile insurance area, candidates should understand Canadian automobile insurance programs including no-fault concepts and residual market requirements. Finally, candidates are introduced to provincial guaranty funds.

READINGS

1. Federal Plans

a. Introduction to Government Insurance

- L Hall, G.M. (Ed.), *Mercer Handbook of Canadian Pension and Benefit Plans* (Eleventh Edition), 1996, CCH Canadian Limited, Chapter 1, "Overview of Retirement Income Arrangements," pp. 1-13, 22-31.
- L Greene, M., "Government Insurers," *Issues in Insurance* (Fourth Edition), American Institute for Property and Liability Underwriters, 1987, Volume I, Sections I and VI.

b. Employment Insurance

- SK Canadian Institute of Actuaries, *Task Force on Unemployment Insurance*, September 1994, excluding Appendices.
- L Hall, G.M. (Ed.), *Mercer Handbook of Canadian Pension and Benefit Plans* (Eleventh Edition), 1996, CCH Canadian Limited, Chapter 14, "Employment Insurance."

c. Government Pension Programs

- L Hall, G.M. (Ed.), *Mercer Handbook of Canadian Pension and Benefit Plans* (Eleventh Edition), 1996, CCH Canadian Limited, Chapter 3, "Government Pension Programs," and Chapter 5, "Financial Management of Pension Plans."
- SK Hallman, G.V.; and Hamilton, K.L., *Personal Insurance: Life, Health & Retirement* (First Edition), American Institute for Chartered Property Casualty Underwriters, 1994, pp. 66-74.

- SK Canadian Institute of Actuaries, *Report of the Task Force on the Future of the Canada/Quebec Pension Plans*, May 1996, excluding Appendices.

d. Natural Disasters

- SK Insurance Services Office, Inc., *Superfund and the Insurance Issues Surrounding Abandoned Hazardous Waste Sites*, Insurance Services Office, Inc., 1995, Executive Summary, Sections 1, 4, and 5. Candidates will not be tested on material that appears in the tables or figures.
- SK Office of the Superintendent of Financial Institutions, "Earthquake Exposure Sound Practices Guideline," 1997, including Appendices 1 and 2. Candidates are not responsible for the tables in Appendix 2.

2. Provincial Plans

a. Provincial Health Plans

- L Hall, G.M. (Ed.), *Mercer Handbook of Canadian Pension and Benefit Plans* (Eleventh Edition), 1996, CCH Canadian Limited, Chapter 12, "Provincial Hospital and Medical Insurance Plans," and Chapter 15, "Hospital, Medical, Drug, Dental and Vision Care Plans."
- SK Canadian Institute of Actuaries, *Task Force on Health Care Financing*, February 1996. Candidates are not responsible for material in tables or figures.

b. Workers' Compensation

- L Chamber of Commerce of the United States, *Analysis of Workers' Compensation Laws*, 1999. Candidates will not be responsible for material contained in the tables.
- L Hall, G.M. (Ed.), *Mercer Handbook of Canadian Pension and Benefit Plans* (Eleventh Edition), 1996, CCH Canadian Limited, Chapter 13, "Workers' Compensation."
- SK Insurance Bureau of Canada Position Paper, "Private Delivery of Workers' Compensation Insurance in Canada," January 1998.

c. Auto—No-Fault and Tort, Public and Private Systems

- SK Ontario Insurance Commission, *Section 411/412 Filing Guidelines for Proposed Revisions to Automobile Insurance Rates and Risk Classification Systems*, November 1996, Part A, Part B, Part C (Sections 3 - 8 and 10), Appendices B and C.
- SK KPMG, "General Insurance Regulatory Amalgamation in Atlantic Canada—Discussion Paper," June 1995, excluding exhibits and Appendix A.
- SK KPMG, Eckler Partners Ltd. & Exactor Insurance Services, Inc., "Motor Vehicle Insurance in British Columbia—At the Crossroads, Volume I: The Case for Change," Section I, parts A, B, and C; Section II; and Section VI.
- SK KPMG, Eckler Partners Ltd. & Exactor Insurance Services, Inc., "Motor Vehicle Insurance in British Columbia—At the Crossroads, Volume II: Options and Choices," Section II; Section III, parts D, H, J, and K; Section VII (excluding charts on pp. III-9, III-12 to III-21).

d. Residual Markets

- SK Hamilton, K.L.; and Malecki, D.S., *Personal Insurance: Property & Liability* (Second Edition), American Institute for Chartered Property Casualty Underwriters, 1999, pp. 191-202, 307-312.
- SK Groupement des assureurs automobiles, *Risk Sharing Plan—Procedures Manual; General Description of the Plan*, 1996, Sections 15A to 15E and 15G.
- SK Groupement des assureurs automobiles, *Risk Sharing Plan—Procedures Manual; By-Law No.7 - Risk Sharing Plan*, 1996, Sections 1.1, 1.11, 2.1 to 2.4, 2.7 to 2.9, 3.1 to 3.3, 3.5 to 3.9, 4.1 to 4.3, 4.4 (candidates will not be responsible for the value of the surcharges), 4.11 to 4.16, 5.1 to 5.5, 7.1 to 7.6, 8.1 to 8.3, 9.1 to 9.6.
- SK Facility Association, *Plan of Operation*, March 1995, pp. 1-5, 23 (candidates will not be responsible for the chart shown on page 24), 30-32, 34-40.
- SK Ghezzi, T.L., "Actuarial Perspective on Property/Casualty Redlining Issues," *Actuarial Digest*, February/March 1996.

e. Guaranty Funds

- SK "Compensation Plan for Property and Casualty Insurers," May 1997.

D. Finance and Solvency

Candidates should have detailed familiarity with the contents, purposes, and recent changes in the Annual Return. This includes recent guidelines from the Office of the Superintendent of Financial Institutions and the provincial regulatory bodies.

Candidates should understand the details of, and the reasons for the differences between, the Statutory and Generally Accepted Accounting Principles (GAAP) accounting methods.

This section is complemented by readings on solvency monitoring systems such as the Minimum Asset Tests, Risk-Based Capital Requirements and the Dynamic Capital Adequacy Testing of the Canadian Institute of Actuaries.

READINGS

1. Financial Reporting

a. Insurance Accounting

- L *Official NAIC Annual Statement Blanks, Property and Casualty*, 1999 (both individual and consolidated basis), pp. 2-4, Schedule P. Candidates will be expected to have knowledge of other sections of the annual statement that are discussed in other *Syllabus* readings.
- L Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, Chapters 2, 5, 9, 10, and 13.
- SK Feldblum, S., "Direct Charges and Credits to Surplus," CAS Study Note, April 1999.
- L KPMG Peat Marwick Thorne, *The Property & Casualty Insurance Industry in Canada*, 1992, excluding Appendix A.
- L 1999 Uniform Annual Return approved by the Canadian Council of Insurance Regulators—P&C-1, pp. 10.40-10.42, 10.60, 20.10-20.51, 30.xx (all), 40.10, 40.90, 60.xx, 65.xx, 67.xx, 70.10-70.35, 80.xx, and 99.10.

- L Canadian Council of Insurance Regulators, *Annual Statement Instructions P&C-1*, Sections I, III, IV, V and VI.
- L Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, Chapter 17.
- SK Feldblum, S., "Selected Exhibits from the Canadian Annual Statement," CAS Study Note, February 1996.
- SK Potvin, R., "Minimum Asset Tests," CAS Study Note, 1995.

b. Expense Reporting

- L 1999 Insurance Expense Exhibit.
- SK Feldblum S., "The Insurance Expense Exhibit and the Allocation of Investment Income" (Fifth Edition), CAS Study Note, May 1997.
- L Insurance Information Centre of Canada, Direct Expense Report, Instructions, Forms and Results, Parts I; and II, Sections A, D, E, and K.

c. Discussions on Financial Reporting

- SK Office of the Superintendent of Financial Institutions Canada, "Guideline on Accounting for Reinsurance of Short-Term Insurance Contracts by Property and Casualty Insurance Enterprises," February 7, 1998.
- SK Office of the Superintendent of Financial Institutions Canada, "Accounting for Structured Settlements: A Position Paper," December 20, 1996.
- SK Insurance Bureau of Canada, "Discounting of Loss Reserves in the Property and Casualty Insurance Industry Phase II," March 1, 1993, Section 1-4, 7, and 8.
- SK Office of the Superintendent of Financial Institutions Canada, "Accounting for Property Casualty Actuarial Liabilities," September 4, 1997.
- SK PricewaterhouseCoopers, "Financial Reporting for the Property & Casualty Insurance Industry," 1999.

- SK Canadian Insurance Accountants Association, Professional Development Program, The Insurance Accountants' Information Circular MDR-31, *Fair Value of Claims Liabilities*, Joe S. Cheng & Partners Inc.
- SK Office of the Superintendent of Financial Institutions Canada, "Annual Disclosure Requirements (Property and Casualty Insurance Enterprises)," December 1997.
- SK Cantin, C.; and Trahan, P.; "Study Note on the Actuarial Evaluation of Premium Liabilities," CAS Study Note, 1999. Candidates will be responsible for Exhibits but not for Appendices.
- SK PricewaterhouseCoopers, "Canadian Tax Guide for Property and Casualty Insurance Enterprises," 1999.

d. Federal Insurance Laws and Regulations

- SK "Insurance Companies Act," *Financial Institutions Act*, Chapter 47, Sections 165(1), 165 (2), 203, 331(1), 331(2), 331(4), 346, 357-370, 464, 465, 476-478, 516(1), 516(4), 517, 581, 626-632, 641, 664, 665, 666(1), 666(2), 667(1), 667(2) and 674 (assented to December 13, 1991).
- SK Canadian Insurance Accountants Association, Professional Development Committee, Research and Legislation Committee Information Circular HR-17, *The Insurance Companies Act Reports and Filings*, Alison R. Manzer, Cassels Brock & Blackwell.
- SK Potvin, R., "Reinsurance (Canadian Companies) Regulations and Reinsurance (Foreign Companies) Regulations," CAS Study Note, 1995.
- SK Office of the Superintendent of Financial Institutions Canada, "1998 Instructions for the Actuary's Report on Property and Casualty Insurance Business."

e. Provincial Insurance Laws and Regulations

- SK Inspecteur General des Institutions Financieres, "Insurers with charters from outside Quebec," December 19, 1997.

2. Solvency

- SK A.M. Best Canada Ltd. (formerly T.R.A.C. Insurance Services Ltd.), *Property and Casualty T.R.A.C. '99* (Eighteenth Edition), pp. 3-1 to 3-21, 4-1 to 4-8. Candidates are not expected to memorize details of published insurance statistics.
- SK Troxel, T.; and Bouchie, G.E., *Property-Liability Insurance Accounting and Finance* (Fourth Edition), American Institute for Chartered Property Casualty Underwriters, 1995, pp. 216-236. Candidates will not be tested on the actual calculation of the IRIS ratios.
- SK Doherty, S., "Sources of Financial Information of Canadian P&C Companies," CAS Study Note, 1995.
- SK Canadian Institute of Actuaries, "Dynamic Capital Adequacy Testing," December 1998.
- SK Canadian Institute of Actuaries, "Educational Note: Dynamic Capital Adequacy Testing—Life, Property and Casualty," June 1999.
- SK Feldblum, S., "NAIC Property/Casualty Insurance Company Risk-Based Capital Requirements" (excluding Section 11 and related exhibits), *PCAS LXXXIII*, 1996, pp. 297-389.

Index to Text References for Exam 7-Canada

The following information is furnished for those who wish to purchase the text references cited for Exam 7-Canada.

Actuarial Bookstore, P.O. Box 430, Somersworth, NH 03878; telephone: (800) 582-9672 or (603) 692-5598; fax: (603) 692-5597; Web site: www.actuarialbookstore.com.

A.M. Best Canada Ltd. (formerly T.R.A.C. Insurance Services Ltd.), Suite 600, 133 Richmond Street West, Toronto, Ontario M5H 2I3, Canada; telephone: (416) 363-8266; Web site: www.trac.com.

American Institute for Chartered Property Casualty Underwriters, Order Department: P.O. Box 3016, 720 Providence Road, Malvern, PA 19355-0716; telephone: (610) 644-2100; fax: (610) 640-9576.

Baer, M.G.; and Rendall, J.A., *Cases on the Canadian Law of Insurance* (Fifth Edition), 1995, Carswell, Attention: Customer and Order Services, One Corporate Plaza, 2075 Kennedy Road, Scarborough, Ontario M1T 3V4, Canada; telephone: (416) 609-3800, or (800) 387-5164; fax: (416) 298-5082; Web site: www.carswell.com.

Brown, C.; *Canadian Insurance Contracts Law in a Nutshell*, 1995, Carswell, Attention: Customer and Order Services, One Corporate Plaza, 2075 Kennedy Road, Scarborough, Ontario M1T 3V4, Canada; telephone: (416) 609-3800, or (800) 387-5164; fax: (416) 298-5082; Web site: www.carswell.com.

Canadian Institute of Actuaries, Secretariat, Suite 820, 360 Albert Street, Ottawa, Ontario K1R 7X7, Canada; telephone: (613) 236-8196; fax: (613) 233-4552; Web site: www.actuaries.ca.

Casualty Actuarial Society *Forum, Foundations of Casualty Actuarial Science* (Third Edition), *PCAS*, and *Discussion Paper Program*, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.

Chamber of Commerce of the United States, 1615 H Street, N.W., Washington, DC 20062; telephone: (202) 659-6000 or (800) 638-6582.

Ettlinger, K.H.; Hamilton, K.L.; and Krohm, G., *State Insurance Regulation* (First Edition), 1995, Insurance Institute of America, 720 Providence Road, Malvern, PA 19355-0770; telephone: (610) 644-2100.

Facility Association, 20 Richmond Street East, Suite 200, Toronto, Ontario M5C 2R9, Canada; telephone: (416) 863-1750, or (800) 268-9572; fax: (416) 868-0894.

Financial Institutions Act, "Insurance Companies Act," Chapter 47, The Federal Publication, 388 King Street West, Toronto, Ontario M5V 1K2, Canada, telephone (416) 860-1611.

Hall, G.M. (Ed.), *Mercer Handbook of Canadian Pension and Benefit Plans* (Eleventh Edition), 1996, CCH Canadian Limited, 90 Shepherd East, Suite 300, North York, Ontario M2N 6X1, Canada; telephone: (416) 224-2248; fax: (800) 461-4131; Web site: www.ca.cch.com.

L'inspecteur general des institutions financieres, 800, place D'Youville – 8 etage, Quebec, PQ G1R 4Y5, Canada; Web site: www.igif.gouv.qc.ca.

Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, IASA Fulfillment Center, P.O. Box 51008, Durham, NC 27717; telephone: (800) 817-4272 or (919) 489-0991; fax: (800) 668-4272; Web site: www.iasa.org.

Insurance Expense Exhibit, John S. Swift Co., Route 46, Teterboro, NJ 07608; telephone: (201) 288-2050.

Insurance Information Centre of Canada (formerly the Insurance Bureau of Canada), 240 Duncan Mill Road, Suite 700, Toronto, Ontario M3B 1Z4, Canada; telephone: (416) 445-5912; fax (416) 445-2183.

Insurance Service Office, 7 World Trade Center, New York, NY 10048; telephone: (800) 888-4476.

Klar, L.N.; Linden, A.M.; Cherniak, E.A.; and Kryworuk, P.W., *Remedies in Tort*, 1997 (Release 6), Volume 4, Carswell, Attention: Customer and Order Services, One Corporate Plaza, 2075 Kennedy Road, Scarborough, Ontario M1T 3V4, Canada; telephone: (416) 609-3800, or (800) 387-5164; fax: (416) 298-5082; Web site: www.carswell.com.

Linden, A.M., *Canadian Tort Law* (Sixth Edition), 1997, Butterworths, The Butterworths Group of Companies, 75 Clegg Road, Markham, Ontario L6G 1A1, Canada; telephone: (905) 479-2665; fax: (905) 479-2826; Web site: www.butterworths.ca.

Mad River Books (A division of ACTEX Publications), 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152, e-mail: retail@actexmadriver.com.

National Association of Insurance Commissioners, 120 W. 12th Street, #1100, Kansas City, MO 64105; telephone: (816) 842-3600.

Office of the Superintendent of Financial Institutions Canada, 255 Albert Street, Ottawa, Ontario K1A 0H2 Canada; telephone (613) 990-7788; fax: (613) 952-8219; Web site: www.osfi-bsif.gc.ca.

Ontario Insurance Commission, 5160 Yonge Street, PO Box 85, North York, Ontario M2N 6L9, Canada; telephone: (416) 250-7250; fax: (416) 590-7070; Web site: www.ontarioinsurance.com.

Exam 7-United States Nation-Specific Examination: Annual Statement, Taxation, and Regulation

Prior to commencing study for this four-hour examination, candidates should read the introduction and key to "Materials for Study" on page 37 of this *Syllabus*. Items marked with a bold SK constitute the 2000 CAS Exam 7-US Study Kit that is available from the CAS Office for a cost of \$45 (\$71 Canadian).

The CAS will test the candidate's knowledge of the material, but may decide not to include questions from every reading on a particular exam.

Section A of this examination covers the aspects of insurance regulation and laws, markets, coverages and private and governmental programs as they impact property/casualty coverages, ratemaking, and pricing in the United States. Section B covers the aspects of statutory and GAAP insurance accounting and taxation as these impact reserving and statutory reporting in the United States.

A. Insurance Law and Regulation

Section A of this examination covers the aspects of insurance regulation and laws, markets, coverages, private and governmental programs as they impact property/casualty coverages, ratemaking, and pricing in the US.

Section 1 covers US tort law. While not a strictly actuarial subject, these affect many areas of an actuary's work. No prior knowledge is assumed in this area and the readings should provide background and a basic understanding of how tort law gives rise to the need for insurance. The judicial role in the development of tort law is also covered.

Sections 2 and 3 cover US statutory insurance and governmental programs. Candidates should gain a detailed knowledge of the US Social Security and Medicare systems. In addition, candidates should gain a working knowledge of the regulations concerning insurance for catastrophe events affecting the United States. In the statutory automobile insurance area, candidates should understand US automobile insurance programs along with no-fault concepts, financial responsibility concepts, and residual market requirements. Finally, an understanding of the regulatory environment surrounding the US Workers Compensation system is required.

Section 4 covers an introduction to regulation including the objectives of regulation. Candidates should understand the regulation of insurers as they provide an essential public service. In addition, an understanding of the dual US state and federal regulatory system is required, along with the various state systems of regulation. The major areas of regulation for rate, contract terms, and solvency should be understood, as should the role of anti-trust law as it pertains to insurance regulation.

Section 5 covers regulation as it affects insurance ratemaking in the United States. The regulator's view of insurer profitability and the concept of excess profit regulation are covered. Regulatory and political aspects of risk classification are also covered. Section 6 extends the topic to the regulation and governmental actions to enhance the availability of insurance.

Section 7 covers the regulation for solvency in the United States, including financial ratios tested by the National Association of Insurance Commissioners (IRIS tests) and guaranty fund mechanisms set up by the various states. Also covered are risk-based capital calculations from the statutory blank and how they are used to monitor solvency.

READINGS

1. Background Law and Insurance

- L Lorimer, J. J.; Perlet, H.F.; Kempin, F.G.; and Hodosh, F. R., *The Legal Environment of Insurance* (Fourth Edition), American Institute for Chartered Property Casualty Underwriters, 1993, Volume II, pp. 1-28, and 71-104.
- SK Keeton, R. "The Impact on Insurance of Trends in Tort Law," *Issues in Insurance* (Third Edition), American Institute for Property and Liability Underwriters, 1984, Volume I.
- SK Hensler, D.R.; Vaiana, M.E.; Kakalik, J.S.; and Peterson, M.A., *Trends in Tort Litigation. The Story Behind the Statistics*, Rand Institute for Civil Justice, 1987.

2. Statutory Insurance—Automobile Insurance

- SK O'Connell, J.; and Joost, R.H., "Giving Motorists a Choice Between Fault and No-Fault Insurance," *Virginia Law Review*, February 1986.

3. Government Programs

- SK Hallman, G.V.; and Hamilton, K.L., *Personal Insurance: Life, Health and Retirement* (First Edition), American Institute for Chartered Property Casualty Underwriters, 1994, pp. 66-74.
- SK Rejda, G.E., "Financing the Social Security Program," *Social Insurance & Economic Security* (Sixth Edition), Prentice Hall, 1999, Chapter 7 (pp. 148-166).
- L Greene, M. "Government Insurers," *Issues in Insurance* (Fourth Edition), American Institute for Property and Liability Underwriters, 1987, Volume I (excluding the final two chapters).
- SK Musulin, R.T., "Issues in the Regulatory Acceptance of Computer Modeling for Property Insurance Ratemaking," *Journal of Insurance Regulation*, Spring 1997, pp. 342-359.
- SK Insurance Services Office, Inc., *Superfund and the Insurance Issues Surrounding Abandoned Hazardous Waste Sites*, Insurance Services Office, Inc., 1995, Executive Summary, Sections 1, 2, 4, 5 and 7. Candidates will not be tested on material that appears only in the tables and figures.

4. Introduction to Regulation

- L Brady, J.L.; Mellinger, J.H.; and Scoles, K.N., *The Regulation of Insurance* (First Edition), Insurance Institute of America, 1995, Chapters 2 (including Exhibit 2-1), 3, 4 and 6 (excluding "Other Interest Groups," pages 172-177 but including Exhibit 6-5). Candidates will not be tested on material that appears only in exhibits unless the exhibit is specifically identified in the *Syllabus*.
- L Brady, J.L.; Mellinger, J.H.; and Scoles, K.N., *The Regulation of Insurance* (First Edition), Insurance Institute of America, 1995, Chapter 5 (excluding "Other Federal Regulation Affecting the Insurance Industry," pages 148-154 but including Exhibit 5-1). Candidates will not be tested on material that appears only in exhibits unless the exhibit is specifically identified in the *Syllabus*.
- SK Joskow, P.L., *Cartels, Competition, and Regulation in the Property-Liability Insurance Industry*.

- SK Krohm, G., "Implications of ISO's Change to Loss Cost Filing for Rate Regulation," *Journal of Insurance Regulation*, March 1990, pp. 316-329.

5. Ratemaking (including Classification and Profitability)

- L Ettlinger, K.H.; Hamilton, K.L.; and Krohm, G., *State Insurance Regulation* (First Edition), Insurance Institute of America, 1995, Chapter 4 (including Exhibits 4-1 and 4-3). Candidates will not be tested on material that appears only in exhibits unless the exhibit is specifically identified in the *Syllabus*.
- SK National Association of Insurance Commissioners, "Report of the Advisory Committee on Competitive Rating to the National Association of Insurance Commissioners," *Proceedings*, 1980, Volume II, Chapter III. Candidates will not be responsible for the language of the model rating law itself nor the alternative model laws submitted in the report.
- SK Feldblum, S., "A Student's Guide to the New York Insurance Law; Article 23: Property/Casualty Insurance Rates," CAS Study Note, 1995.
- SK New York (State) Laws, Statutes, etc., *New York Insurance Law*, Article 23 (all sections). Candidates are responsible only for the sections of the law as stated. If studying from publications such as the Consolidated Laws Service, which cite case histories as well as the law itself, candidates are not responsible for the case histories although they may be helpful in gaining an understanding of the law. Candidates will not be tested on those sections of the New York laws dealing exclusively with life insurance and/or annuities.
- SK Harrington, S.E.; Doerpinghaus, H.I., "The Economics and Politics of Automobile Insurance Rate Classification," *Journal of Risk and Insurance*, 1993, pp. 59-84.
- L Williams, C.A., "Regulating Property and Liability Insurance Rates Through Excess Profits Statutes," *Journal of Risk and Insurance*, September 1983, pp. 445-472.

6. Shared Markets and Availability

- SK** Hamilton, K.L.; and Malecki, D.S., *Personal Insurance: Property & Liability* (Second Edition), American Institute for Chartered Property Casualty Underwriters, 1999, pp. 191-202, 307-312.
- SK** Ghezzi, T.L., "Actuarial Perspective on Property/Casualty Redlining Issues," *Actuarial Digest*, Volume 15, No. 1, February/March 1996.

7. Solvency Monitoring and Guaranty Funds

- L** Ettlinger, K.H.; Hamilton, K.L.; and Krohm, G., *State Insurance Regulation* (First Edition), Insurance Institute of America, 1995, Chapter 6 (excluding "Monitoring Capital Adequacy Through Risk-Based Capital," pp. 156-161 but including Exhibits 6-1 and 6-3) and Chapter 8. Candidates will not be tested on material that appears only in exhibits unless the exhibit is specifically identified in the *Syllabus*.
- SK** Feldblum, S., "NAIC Property/Casualty Insurance Company Risk-Based Capital Requirements" (excluding Section 11 and related exhibits), *PCAS LXXXIII*, 1996, pp. 297-389.
- SK** Wilcox, C.J., "The US Guaranty Association Concept at 25," *Journal of Insurance Regulation*, Spring 1996, pp. 369-371 (up to The Life and Health Scorecard) and pages 385-403 (starting with The Property and Casualty Scorecard).
- SK** Troxel, T.; and Bouchie, G.E., *Property-Liability Insurance Accounting and Finance* (Fourth Edition), American Institute for Chartered Property Casualty Underwriters, 1995, pp. 216-236. Candidates will not be tested on the actual calculation of the IRIS ratios.

B. Accounting

Section B covers the aspects of statutory and GAAP insurance accounting and taxation as they impact reserving and statutory reporting in the US.

The material in this examination assumes a working knowledge of general accounting such as would be gained from Exam 6. If needed, a review of sections of the IASA text, CPCU 8 text, or other general accounting material may enhance the understanding of the United States specific material presented on this examination.

Candidates should gain a thorough knowledge of United States statutory accounting forms presented in the NAIC blanks and the Insurance Expense Exhibits. A detailed knowledge of reserves and values required in the blank is needed. Knowledge of federal income tax treatment, including reserve discounting, should also be mastered.

Related to these areas, this section covers the codification of statutory accounting, differences in the accounting treatment for GAAP, tax, and statutory uses, and audits of insurance companies.

READINGS

- L** Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, Chapters 1, 2, 5, 8, 9, 10, 12-14, and 17. (For Chapter 12, only pp. 1-36 and 62-72).
- L** *Official 1999 NAIC Annual Statement Blanks, Property and Casualty*, (both individual and consolidated basis), pp. 2-13, 15; Notes 13-19, 21-23, 27, Schedules D (exclude DA, DB, and DC), DM, F, H, P. Candidates will be expected to have knowledge of other sections of the annual statement that are discussed in other *Syllabus* readings. [NOTE: Page numbers refer to the 1998 statement. The Web version of the *Syllabus* and the *Notice of Examinations* will contain updated page references.]
- SK** Feldblum, S., "Selected Notes to the Fire and Casualty Annual Statement" (Fourth Edition), CAS Study Note, April 1999.
- SK** Feldblum, S., "Direct Charges and Credits to Surplus," CAS Study Note, April 1999.
- SK** Feldblum, S., "Reinsurance Accounting: Schedule F" (Sixth Edition), CAS Study Note, August 1999.
- SK** Feldblum, S., "Completing and Using Schedule P" (Third Edition), CAS Study Note, January 1996, and "Addendum for 1997 and 1998 Changes," 1999.
- SK** American Institute of Certified Public Accountants, *Audits of Property and Liability Insurance Companies*, 1993, Chapter 8.
- SK** Almagro, M.; and Ghezzi, T.L., "Federal Income Taxes—Provisions Affecting Property/Casualty Insurers," *PCAS LXXV*, 1988, pp. 95-161.

- SK** Feldblum, S., "Selected Exhibits from the Canadian Annual Statement," CAS Study Note, February 1996.
- L** Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, Appendix D, pp. D12, D13, D20, D21, D22, and D23 (Canadian Annual Statement Exhibits).
- L** 1999 Insurance Expense Exhibit.
- SK** Feldblum, S., "The Insurance Expense Exhibit and the Allocation of Investment Income" (Fifth Edition), CAS Study Note, May 1997.
- L** New York State Regulations, Title 11, 1963, Parts 105-109 (Regulation 30).
- L** Insurance Accounting and Systems Association, "Uniform Classification of Expenses for Property and Liability Insurance Companies," *Proceedings* 1979, pp. 290-292.
- SK** The Casualty Actuarial (Technical) Task Force, National Association of Insurance Commissioners, "Clarification of Revised ALAE Definition," June 24, 1997.
- SK** Siegel, H.W., "Laws and Sausages, How Statutory Accounting Was Codified," *Contingencies*, American Academy of Actuaries, September/October 1998, pp. 36-39.
- SK** National Association of Insurance Commissioners, Statutory Codification Project Issue Paper No. 46, "Accounting for Investments in Subsidiary, Controlled and Affiliated Entities," Paragraphs 1-23.
- SK** National Association of Insurance Commissioners, Statutory Codification Project Issue Paper No. 53, "Property and Casualty Contracts-Premiums."
- SK** National Association of Insurance Commissioners, Statutory Codification Project Issue Paper No. 65, "Property and Casualty Contracts," Paragraphs 1-39.
- SK** National Association of Insurance Commissioners, Statutory Codification Project Issue Paper No. 75, "Property and Casualty Reinsurance," Paragraphs 1-14.

- SK** National Association of Insurance Commissioners, Statutory Codification Project Issue Paper No. 83, "Accounting for Income Taxes," Paragraphs 1-25.

Index to Text References for Exam 7-United States

The following information is furnished for those who wish to purchase the text references cited for Exam 7-United States.

Actuarial Bookstore, P.O. Box 430, Somersworth, NH 03878; telephone: (800) 582-9672 or (603) 692-5598; fax: (603) 692-5597; Web site: www.actuarialbookstore.com.

Actuarial Digest, P.O. Box 1127, Ponte Vedra, FL 32004.

American Institute of Certified Public Accountants, 1211 Avenue of the Americas, New York, NY 10036; telephone: (212) 318-0500.

American Institute for Chartered Property Casualty Underwriters, Order Department: P.O. Box 3016, 720 Providence Road, Malvern, PA 19355-0716; telephone: (610) 644-2100; fax: (610) 640-9576.

Association Form of the 1999 Annual Statement Blanks, John S. Swift Co., Route 46, Teterboro, NJ 07608; telephone: (201) 288-2050.

Casualty Actuarial Society *Forum, Foundations of Casualty Actuarial Science* (Third Edition), *PCAS*, and *Discussion Paper Program*, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.

Contingencies, American Academy of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173; telephone: (847) 706-3513; fax: (847) 706-3599.

Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, IASA Fulfillment Center, P.O. Box 51008, Durham, NC 27717; telephone: (800) 817-4272 or (919) 489-0991; fax: (800) 668-4272; Web site: www.iasa.org.

Insurance Expense Exhibit, 1998, John S. Swift Co., Route 46, Teterboro, NJ 07608; telephone: (201) 288-2050.

Insurance Institute of America, 720 Providence Road, Malvern, PA 19355-0770; telephone: (610) 644-2100.

Insurance Services Office, 7 World Trade Center, New York, NY 10048; telephone: (800) 888-4476.

Journal of Insurance Regulation, National Association of Insurance Commissioners, 120 W. 12th Street, #1100, Kansas City, MO 64105; telephone: (816) 842-3600.

Journal of Risk and Insurance (The), American Risk and Insurance Association, The Wharton School, Colonial Penn Center, 3641 Locust Walk, Philadelphia, PA 19104-6218.

Mad River Books (A division of ACTEX Publications), 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152, e-mail: retail@actexamdriver.com.

National Association of Insurance Commissioners, 120 W. 12th Street, #1100, Kansas City, MO 64105; telephone: (816) 842-3600.

New York (State) Insurance Department, Publications Unit, Agency Building 1, Empire State Plaza, Albany, NY 12257; telephone: (518) 474-1203.

New York (State) Laws, Statutes, etc., from New York Insurance Law may be obtained from the West Publishing Company, a division of International Thompson Publishing, Order Department, P.O. Box 6904, Florence, KY 41022; telephone: (800) 347-7707.

Rejda, G.E., *Social Insurance and Economic Security* (Sixth Edition), 1999, Prentice-Hall, Inc.; telephone: (800) 374-1200.

Fellowship Examinations

Exam 8 Investments and Financial Analysis

Prior to commencing study for this four-hour examination, candidates should read the introduction and key to "Materials for Study" on page 37 of this *Syllabus*. Items marked with a bold **SK** constitute the 2000 CAS Exam 8 Study Kit that is available from the CAS Office for a cost of \$30 (\$48 Canadian).

The CAS will test the candidate's knowledge of the material, but may decide not to include questions from every reading on a particular exam.

Examination 8 is the culmination of the candidate's preparation in Finance, Financial Risk, and the treatment of the insurance enterprise as a whole. Section 8A completes the treatment of Finance generally, and investments particularly, including their management. Section 8B then considers the risks from both parts of the balance sheet together, as exemplified by the section on Dynamic Financial Analysis (DFA), and also in the more traditional Asset Liability Management (ALM) and Valuation sections, and the still-developing Financial Risk Management area. In general, relevant country-specific information, such as Risk Based Capital, is covered in Exam 7. The material in Exam 8 builds most particularly on the Finance material in Exam 2. It also presupposes knowledge about liability and reserve risk from Exam 6, underwriting exposure from Exam 5, and knowledge of modeling from Exams 3 and 4.

There are various numeric tables scattered throughout these readings, illustrating actual observations or hypothetical examples. Although candidates are responsible for understanding the concepts illustrated, they will not be responsible for the actual numeric values.

A. Investments

Section 8A focuses on the Investment, or Asset, side of the balance sheet. It builds upon much of the Finance material presented in Exam 2.

The material is divided into 10 subparts. Included are a general introduction to financial instruments; asset risk; portfolio theory; CAPM, index models and arbitrage pricing; equity valuation models; valuation of bonds and the structure of interest rates; more detailed discussion of types

of fixed index securities; derivatives in the form of options and futures, including the Black-Scholes option pricing model; international securities; and portfolio management.

In addition to the broad coverage of classical material, such as types of instruments, markets, structure of interest rates, and equity valuation, there is more advanced coverage of some other topics, such as arbitrage pricing theory and the Black-Scholes approach to options pricing. Mastery of this material should make the candidate well-equipped to work with professionals in the finance area, and evaluate investment material and investment choices. In concert with actual experience and appropriate ad hoc study, it also could provide a foundation for more in depth involvement in the general Investment area. In general, candidates are expected to be knowledgeable about the instruments presented in the readings, their financial characteristics, their prices, their risk characteristics, and the techniques for optimizing and managing portfolios.

READINGS

There are four texts used for Part A: *Investments* by Bodie, Kane and Marcus (1999); *Modern Portfolio Theory and Investment Analysis* by Elton and Gruber (1995); *The Handbook of Fixed Income Securities* edited by Fabozzi (1997); and *Options, Futures and Other Derivatives* by Hull (1999). In most cases, the same material is covered in two or more of these texts. Although only the chapters and sections listed will be tested directly, a candidate who would like a different and/or additional treatment of the material will find it in the other texts. Portions of the four main texts are used throughout. It is strongly suggested that the candidate read the material in the order listed, rather than reading all the material in one text, and then moving on to the next text.

1. Introduction: Financial Instruments and Markets

- L Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fourth Edition), Irwin McGraw-Hill, 1999, Chapter 2. (For background, the candidate may wish to refer to Chapter 1, but no questions will be taken from this reading.)
- L Hull, J.C., *Options, Futures, and Other Derivatives* (Fourth Edition), Prentice Hall, 1999. No required reading for this section. (For background, the candidate may wish to refer to Chapter 1, excluding 1.4, but no questions will be taken from this reading.)

- L Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fourth Edition), Irwin McGraw-Hill, 1999, Chapter 5. (For background, the candidate may wish to refer to Chapters 3 and 4, but no questions will be taken from this reading.)

2. Asset Risk

- L Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Fifth Edition), Irwin, 1997, Chapter 2.

3. Portfolio Theory

- L Elton, E.J.; and Gruber, M.J., *Modern Portfolio Theory and Investment Analysis* (Fifth Edition), John Wiley & Sons, 1995, Chapters 4, 5, 6 (excluding Appendices B and C), 7, 8, and 9.
- L Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fourth Edition), Irwin McGraw-Hill, 1999, Appendices 6A, 8B, and 8C.

4. CAPM, Index Models, Arbitrage Pricing

- L Elton, E.J.; and Gruber, M.J., *Modern Portfolio Theory and Investment Analysis* (Fifth Edition), John Wiley & Sons, 1995, Chapters 13, 14 (excluding Appendix), and 16 (pp. 368-374 only, up to, but not including, "Estimating and Testing APT").
- L Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fourth Edition), Irwin McGraw-Hill, 1999, Chapter 13.

5. Equity Valuation Models

- L Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fourth Edition), Irwin McGraw-Hill, 1999, Chapter 18.

6. Valuation of Bonds and the Structure of Interest Rates

- L Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Fifth Edition), Irwin, 1997, Chapter 4.
- L Elton, E.J.; and Gruber, M.J., *Modern Portfolio Theory and Investment Analysis* (Fifth Edition), John Wiley & Sons, 1995, Chapter 20.
- L Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Fifth Edition), Irwin, 1997, Chapter 5.

7. Types of Fixed Income Securities

- L Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Fifth Edition), Irwin, 1997, Chapters 8 (pp. 149-156 up to, but not including, "Federal Agency Securities"), 9 (pp. 161-164, up to, but not including, "Airport Revenue Bonds;" pp. 166-168, from "Hybrid and Special Bond Securities" up to, but not including "Insured Bonds;" pp. 169-182, from "Money Market Products" up to, but not including, "Tax Provisions Affecting Municipals"), 10 and 11.
- SK Altman, E.I., "Measuring Corporate Bond Mortality and Performance." *The Journal of Finance*, Volume 44, No. 4, September 1989, pp. 909-922.
- L Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Fifth Edition), Irwin, 1997, Chapter 26.

8. Options and Futures

- L Hull, J.C., *Options, Futures, and Other Derivatives* (Fourth Edition), Prentice Hall, 1999, Chapters 2 (excluding 2.4, 2.7, and 2.11), 3 (excluding Appendix 3A), 4 (only 4.6, 4.11, 4.14, 4.15, and Summary), 6-10 (excluding Appendix 10A), and 11 (excluding Appendix 11A).
- L Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Fifth Edition), Irwin, 1997, Chapter 36.

9. International Securities

- L Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fourth Edition), Irwin McGraw-Hill, 1999, Chapter 25 (pp. 786-793 and 797-799 from "Passive and Active International Investing" up to, but not including, "Asset Allocation").
- L Elton, E.J.; and Gruber, M.J., *Modern Portfolio Theory and Investment Analysis* (Fifth Edition), John Wiley & Sons, 1995, Chapter 12 (pp. 262-276 up to, but not including, "Return Expectations and Portfolio Performance" and 279-284 from "Other Evidence on Internationally Diversified Portfolios" up to, but not including, "Models for Managing International Portfolios").
- L Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Fifth Edition), Irwin, 1997, Chapter 17 (pp. 327-332).

10. Portfolio Management

- L Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fourth Edition), Irwin McGraw-Hill, 1999, Chapters 16 (excluding 16.1 and 16.3) and 26 (excluding 26.1 and 26.2).

B. Financial Analysis

Section 8B examines insurance companies' management of financial risk from a global perspective. Asset risk and liability risk are examined together. The relatively recent Dynamic Financial Analysis approach is presented in the first section. The candidate is expected to gain an understanding of what constitutes DFA, when it is likely to be used, how to use and interpret it, and what some of the considerations are in constructing a DFA model. It is not expected that the candidate would actually be able to construct a working DFA model based solely on this material.

Asset liability management is presented in the next section. Although this is either being supplanted by, or becoming a part of, DFA, it is still very much a function explicitly, or sometimes implicitly, performed by most companies. The readings provide a reasonable exposure to this process, and the candidate should understand and be in a position to demonstrate knowledge of the issues presented, and the solutions. In the Surplus Adequacy and Financial Risk Management Section, the concept of Expected Policyholder's Deficit is covered.

In the section on Valuation, the candidate should understand the primary factors and issues in performing valuations. Finally, in the section on Portfolio Risk Models in Other Industries, the candidate is exposed to the Value at Risk concept as used in Banking.

READINGS

1. Dynamic Financial Analysis

NOTE: Some of the papers in this section discuss specific models of specific vendors. The inclusion of these papers does not imply an endorsement of these models or vendors by the Casualty Actuarial Society.

- SK CAS Valuation and Financial Analysis Committee, Subcommittee on Dynamic Financial Models, "Dynamic Financial Models of Property/Casualty Insurers," *CAS Forum*, Fall 1995, pp. 93-127.

- SK D'Arcy, S.P.; Gorvett, R.W.; Herbers, J.A.; Hettinger, T.E.; Lehmann, S.G.; and Miller, M.J., "Building a Public Access PC-Based DFA Model," *CAS Forum*, Summer 1997, Volume 2, pp. 1-40.
- SK D'Arcy, S.P.; Gorvett, R.W.; Hettinger, T.E.; and Walling, R. J., "Using the Public Access DFA Model: A Case Study," *CAS Forum*, Summer 1998, pp. 53-118.
- SK Kirschner, G.S.; and Scheel, W.C., "Specifying the Functional Parameters of a Corporate Financial Model for Dynamic Financial Analysis," *CAS Forum*, Summer 1997, Volume 2, pp. 41-88. Although the candidate should be familiar with the information and concepts presented in the exhibits, no questions will be drawn directly from them.
- SK Lowe, S.P.; and Stanard, J.N., "An Integrated Dynamic Financial Analysis and Decision Support System for a Property Catastrophe Reinsurer," *ASTIN Bulletin*, Volume 27, Number 2, November 1997, pp. 339-371.
- SK Correnti, S.; Sonlin, S.M.; and Isaac, D.B., "Applying A DFA Model to Improve Strategic Business Decisions," *CAS Forum*, Summer 1998, pp. 15-51.

2. Asset Liability Management

- SK Feldblum, S., "Asset Liability Matching For Property/Casualty Insurers," *Valuation Issues, CAS Special Interest Seminar*, 1989, pp. 117-154.
- SK Noris, P.D., "Asset/Liability Management Strategies for Property and Casualty Companies," Morgan Stanley, May 1985, excluding Sections I, II, V, and VI.
- L Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Fifth Edition), Irwin, 1997, Chapters 48 and 49.

3. Surplus Adequacy and Financial Risk Management

- SK Butsic, R.P., "Solvency Measurement for Property-Liability Risk-Based Capital Applications," *The Journal of Risk and Insurance*, Volume 61, No. 4 (December 1994), pp. 656-690.

4. Insurance Company Valuation

- SK Miccolis, R.S., "An Investigation of Methods, Assumptions, and Risk Modeling for the Valuation of Property/Casualty Insurance Companies," *Financial Analysis of Insurance Companies, CAS Discussion Paper Program*, 1987, pp. 281-321. (For background, the candidate may wish to refer to Sturgis, R.W., "Actuarial Valuation of Property/Casualty Insurance Companies," *PCAS LXVIII*, 1981, pp. 146-159, including discussions of paper: Lowe, S.P., *PCAS LXIX*, 1982, pp. 120-126; Rothman, R.; and Deutsch, R.V., *PCAS LXIX*, 1982, pp. 126-130. However, no questions will be taken from the background readings.)
- SK Actuarial Standards Board of the American Academy of Actuaries, "Actuarial Standard of Practice, No. 19, Actuarial Appraisals (Doc. No. 034)," 1991.
- SK Casualty Actuarial Society, "Statement of Principles Regarding Property and Casualty Valuations" as adopted September 22, 1989, Casualty Actuarial Society.

5. Portfolio Risk Models in Other Industries

- SK Jorion, P., "Risk²: Measuring the Risk in Value at Risk," *Financial Analysts Journal*, November/December 1996, pp. 47-56.

Index to Text References for Exam 8

The following information is furnished for those who wish to purchase the text references cited for Exam 8.

Actuarial Bookstore, P.O. Box 430, Somersworth, NH 03878; telephone: (800) 582-9672 or (603) 692-5598; fax: (603) 692-5597; Web site: www.actuarialbookstore.com.

Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fourth Edition), 1999, Irwin McGraw-Hill, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.

Casualty Actuarial Society *Forum, Foundations of Casualty Actuarial Science* (Third Edition), *PCAS*, and *Discussion Paper Program*, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.

Elton, E.J.; and Gruber, M.J., *Modern Portfolio Theory and Investment Analysis* (Fifth Edition), 1995, John Wiley & Sons, One Wiley Drive, Somerset, NJ 08875; telephone: (800) 225-5945 or (732) 469-4400.

Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Fifth Edition), 1997, Irwin McGraw-Hill, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.

Hull, J.C., *Options, Futures, and Other Derivatives* (Fourth Edition), 1999, Prentice Hall; telephone: (800) 374-1200; Web site: www.prenhall.com.

Mad River Books (A division of ACTEX Publications), 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152, e-mail: retail@actexamdriver.com.

Exam 9 Advanced Ratemaking, Rate of Return, and Individual Risk Rating Plans

Prior to commencing study for this four-hour examination, candidates should read the introduction and key to "Materials for Study" on page 37 of this *Syllabus*. Items marked with a bold **SK** constitute the 2000 CAS Exam 9 Study Kit that is available from the CAS Office for a cost of \$37 (\$59 Canadian).

The CAS will test the candidate's knowledge of the material, but may decide not to include questions from every reading on a particular exam.

A. Advanced Ratemaking Techniques

Candidates for this part are expected to have acquired considerable technical knowledge and practical experience in insurance ratemaking. This examination will assume a working knowledge of basic ratemaking and will deal with advanced problems such as those covered in the readings listed on the next page. The ability to apply ratemaking knowledge and experience may be tested through questions dealing with problems for which there are no generally recognized solutions. To some degree, they will deal with the types of practical problems that a fully qualified actuary working in ratemaking should be able to solve.

Advanced Ratemaking Techniques consists of four sections:

1. Classification Ratemaking Topics;
2. Excess and Deductible Rating;
3. Rate of Return; and
4. The Loading for Risk.

The readings in this part should be read for illustrations of basic principles and theories, as well as insights into advanced ratemaking problems and their solutions. In none of the readings is the derivation of formulae or equations to be stressed, but applications of those techniques may be required. Some readings are included primarily for their historical significance or to illustrate unique solutions to a ratemaking problem.

READINGS

1. Classification Ratemaking Topics

This section deals with the establishment of classifications, class relativities, and linear credibility.

American Academy of Actuaries Committee on Risk Classification, "Risk Classification Statement of Principles," June 1980. [Available from the American Academy of Actuaries at (202) 223-8196 at no charge.]

- SK Bailey, R.A.; and Simon, L.J., "An Actuarial Note on the Credibility of Experience of a Single Private Passenger Car," *PCAS XLVI*, 1959, pp. 159-164. Including discussion of paper: Hazam, W.J., *PCAS XLVII*, 1960, pp. 150-152.
- L Cummins, J.D.; Smith, B.D.; Vance, R.N.; and VanDerhei, J.L., *Risk Classification in Life Insurance*, 1983, Chapters 3 and 4. Candidates are not responsible for mathematical proofs. (This text can be purchased from the CAS. Use the white order form inside the back cover of the *Syllabus*.)
- SK Mahler, H.C., "An Example of Credibility and Shifting Risk Parameters," *PCAS LXXVII*, 1990, pp. 225-282. Candidates will not be tested on the appendices.
- SK Holler, K.D.; Sommer, D.B.; and Trahair, G., "Something Old, Something New in Classification Ratemaking with a Novel Use of GLMs for Credit Insurance," *Casualty Actuarial Society Forum*, Winter 1999, Sections 1 and 2 and the Appendix.

2. Excess and Deductible Rating

This section deals with specific techniques for risk sharing between an insured and an insurer.

Candidates should have a general knowledge and understanding of deductible and excess coverages, and the problems inherent in pricing these coverages for various lines.

- SK Lee, Y.S., "The Mathematics of Excess of Loss Coverages and Retrospective Rating—A Graphical Approach," Sections 1-3, *PCAS LXXV*, 1988, pp. 49-64.

- SK Miccolis, R.S., "On the Theory of Increased Limits and Excess of Loss Pricing," *PCAS LXIV*, 1977, pp. 27-59. Including discussion of paper: Rosenberg, S., *PCAS LXIV*, 1977, pp. 60-73.
- SK Finger, R.J., "Estimating Pure Premiums by Layer," *PCAS LXIII*, 1976, pp. 34-52. Including discussion of paper: Steeneck, L.R., *PCAS LXIII*, 1976, pp. 53-55.
- SK Teng, M.T.S., "Pricing Workers' Compensation Large Deductible and Excess Insurance," *Casualty Actuarial Society Forum*, Winter 1994, pp. 413-437.
- SK Gillam, W.R.; and Snader, R.H., "Fundamentals of Individual Risk Rating," National Council on Compensation Insurance (Study Note), 1992, Part III.

3. Rate of Return

This section explores the relationship between insurance concepts (such as underwriting profits, premium-to-surplus ratios, and investment income) and financial concepts (such as interest rates, inflation rates, cost of capital, and risk premiums). The readings build on a background of finance as related to the insurance business and deal with specific techniques used by actuaries to develop an appropriate profit loading in insurance prices.

- SK D'Arcy, S.P.; and Dyer, M.A., "Ratemaking: A Financial Economics Approach," *PCAS LXXXIV*, 1997. Only Sections 4, 6, and 8 will be directly tested, but the other sections may provide useful background.
- SK Butsic, R.P., "Determining the Proper Interest Rate for Loss Reserve Discounting: An Economic Approach," *Evaluating Insurance Company Liabilities*, *Casualty Actuarial Society Discussion Paper Program*, 1988, pp. 147-188.
- SK Ferrari, J.R., "The Relationship of Underwriting, Investment, Leverage, and Exposure to Total Return on Owners' Equity," *PCAS LV*, 1968, pp. 295-302. Includes discussion: Balcarek, R.J., *PCAS LVI*, 1969, pp. 58-60.
- SK Robbin, Ira, "The Underwriting Profit Provision," CAS Study Note, as updated in 1992.

- SK** Roth, R., "Analysis of Surplus and Rate of Return Without Using Leverage Ratios," *Insurer Financial Solvency, Casualty Actuarial Society Discussion Paper Program*, 1992, Volume I, pp. 439-464.
- SK** Feldblum, S., "Pricing Insurance Policies: The Internal Rate of Return Model," CAS Study Note, May 1992. Only Sections 1, 3, and 6 will be directly tested, but the other sections may provide useful background.

4. The Loading for Risk

Because insurance claims are fortuitous, the loading for profit in rates may not be realized. The models discussed in Section 3 tend to assume that insured events are predictable in time and amount. Some consideration should be made for this, particularly where capacity is limited and sufficient diversification of exposure is impossible.

- SK** Feldblum, S., "Risk Load for Insurers," *PCAS LXXVII*, 1990, pp. 160-195, including discussions of paper: Philbrick, S.W., *PCAS LXXVIII*, 1991, pp. 56-63; and Bault, T., *PCAS LXXXII*, 1995, pp. 78-96.
- SK** Stone, J.M., "A Theory of Capacity and the Insurance of Catastrophe Risks," *The Journal of Risk and Insurance*, June 1973, Volume XL Number 2, Part I, pp. 231-243, and September 1973, Volume XL Number 3, Part II, pp. 339-355.

B. Individual Risk Rating

One of the important functions performed by an actuary is the rating of individual risks. Prior to Exam 9, most of the readings were addressed to group or classification risk rating. This part is intended to prepare candidates to design and manage an individual risk rating system.

Individual Risk Rating consists of two sections:

1. Experience Rating, which uses individual risk experience to adjust rates prospectively; and
2. Retrospective Rating, which uses subject individual risk experience to adjust premium after completion of the policy.

The readings range from those that discuss the theoretical foundation of individual risk rating to those that discuss the application of various plans.

Candidates will be expected to have a good working knowledge of credibility, loss limitation, and rate modification concepts as they apply to prospective and retrospective rating. In addition, they will be expected to have knowledge of loss distribution, insurance charge, and excess loss charge concepts as they apply to loss retention programs. Candidates can be expected to apply these concepts in a creative and problem-solving manner.

Candidates are also expected to be knowledgeable in the application of individual risk rating plans currently in use (excluding individual state pages) and should anticipate answering questions in the manner of an insurance consultant for an insured.

READINGS

1. Experience Rating

The main idea behind experience rating is to tailor the individual risk rate so it will be more nearly correct to cover the costs brought to the system by that risk. The readings begin with principles and concepts, then move to a discussion of plans in current use.

- SK** Venter, G.G., "Experience Rating—Equity and Predictive Accuracy," *NCCI Digest*, April 1987, Volume II, Issue I, p. 27-35.
- SK** Gillam, W.R., "Workers' Compensation Experience Rating: What Every Actuary Should Know," *PCAS LXXIX*, 1992, Sections 1-5, pp. 215-239.
- SK** Gillam, W.R.; and Snader, R.H., "Fundamentals of Individual Risk Rating," National Council on Compensation Insurance (Study Note), 1992, Part I.
- SK** National Council on Compensation Insurance, *The 1998 Adjustment to the Experience Rating Plan: Your Guide to Understanding the Changes*.
- SK** National Council on Compensation Insurance, *Experience Rating Plan Manual for Workers Compensation and Employers Liability Insurance* (as of July 1, 1999). Candidates are responsible for only the excerpted material.
- SK** Insurance Services Office, Inc., *Experience and Schedule Rating Plans Applicable to General Liability*, ISO Circular GL-90-217 (Conversion to Loss Cost Basis).

2. Retrospective Rating

Retrospective rating allows adjustment of individual risk premium after expiration of its policy, respective of actual loss and expenses associated with the coverage. The current plans in use involve retention of loss and loss expense up to limits (both on an aggregate and on an individual occurrence basis) selected in advance.

- SK Gillam, W.R.; and Snader, R.H., "Fundamentals of Individual Risk Rating," National Council on Compensation Insurance (Study Note), 1992, Part II.
- SK National Council on Compensation Insurance, *Retrospective Rating Plan Manual for Workers Compensation and Employers Liability Insurance* (as of July 1, 1998). Candidates are responsible for only the excerpted material.
- SK Insurance Services Office, Inc., *Retrospective Rating Plan for Automobile, General Liability, Glass and Theft* (July 1989 edition).
- SK Lee, Y.S., "The Mathematics of Excess of Loss Coverage and Retrospective Rating—A Graphical Approach," Section 4, *PCAS LXXV*, 1988, pp. 64-78. Candidates are not responsible for "Other Applications" on pp. 75-76.
- SK Skurmick, D., "The California Table L," *PCAS LXI*, 1974, Section 1, pp. 117-123. Including discussion of this paper: Gillam, W.R., *PCAS LXXX*, 1993, pp. 353-365.
- SK Gillam, W.R., "Retrospective Rating: Excess Loss Factors," *PCAS LXXVIII*, 1991, pp. 1-40. Candidates are not responsible for loss distribution formulae.

Index to Text References for Exam 9

The following information is furnished for those who wish to purchase the text references cited for Exam 9.

Actuarial Bookstore, P.O. Box 430, Somersworth, NH 03878;
telephone: (800) 582-9672 or (603) 692-5598; fax: (603) 692-5597; Web site: www.actuarialbookstore.com.

Casualty Actuarial Society *Forum*, *Foundations of Casualty Actuarial Science* (Third Edition), *PCAS*, and *Discussion Paper Program*, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.

Cummins, J.D.; Smith, B.D.; Vance, R.N.; and VanDerhei, J.L., *Risk Classification in Life Insurance*, 1983. (Candidates may purchase book from the CAS Office.)

Insurance Services Office, 7 World Trade Center, New York, NY 10048; telephone: (800) 888-4476.

Mad River Books (A division of ACTEX Publications), 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152, e-mail: retail@actexmadriver.com.

National Council on Compensation Insurance, 750 Park of Commerce Drive, Boca Raton, FL 33487; telephone: (800) NCCI-123.

Index to Text References

Many of the text references may be borrowed from the CAS Library. Material that is new in 2000 will be made available as soon as possible. The following information is furnished for those who wish to purchase the text references cited in the examination descriptions.

Exam(s) Text

- All Actuarial Bookstore, P.O. Box 430, Somersworth, NH 03878; telephone: (800) 582-9672 or (603) 692-5598; fax: (603) 692-5597; Web site: www.actuarialbookstore.com.
- 7US *Actuarial Digest*, P.O. Box 1127, Ponte Vedra, FL 32004.
- 5, 6 Actuarial Standards Board, American Academy of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173; telephone: (847) 706-3513; fax: (847) 706-3599.
- 7C A.M. Best Canada Ltd. (formerly T.R.A.C. Insurance Services Ltd.), Suite 600, 133 Richmond Street West, Toronto, Ontario M5H 2I3, Canada; telephone: (416) 363-8266; Web site: www.trac.com.
- 7US American Institute of Certified Public Accountants, 1211 Avenue of the Americas, New York, NY 10036; telephone: (212) 318-0500.
- 5, 6, 7C, 7US American Institute for Chartered Property Casualty Underwriters, Order Department: P.O. Box 3016, 720 Providence Road, Malvern, PA 19355-0716; telephone: (610) 644-2100, fax: (610) 640-9576.
- 7US American Insurance Association, *Summary of Selected State Laws and Regulations Relating to Automobile Insurance* (1997 Edition), American Insurance Association, 1130 Connecticut Avenue, N.W., Washington, DC 20036; telephone (202) 828-7100.
- 1 Anton, H., *Calculus: A New Horizon* (Sixth Edition), 1998, John Wiley and Sons, One Wiley Drive, Somerset, NJ 08875; telephone: (800) 225-5945 or (732) 469-4400.
- 7US *Association Form of the 1998 Annual Statement Blanks*,
- 7C Baer, M.G.; and Rendall, J.A., *Cases on the Canadian Law of Insurance* (Fifth Edition), 1995, Carswell, Attention: Customer and Order Services, One Corporate Plaza, 2075 Kennedy Road, Scarborough, Ontario M1T 3V4, Canada; telephone: (416) 609-3800, or (800) 387-5164; fax: (416) 298-5082; Web site: www.carswell.com.
- 8 Bodie, Z.; Kane, A.; and Marcus, A.J., *Investments* (Fourth Edition), 1999, Irwin McGraw-Hill, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.
- 3 Bowers, N.L.; Gerber, H.U.; Hickman, J.C.; Jones, D.A.; and Nesbitt, C.J., *Actuarial Mathematics* (Second Edition), 1997, Society of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: www.soa.org.
- 2 Brealey, R.A.; and Myers, S.C., *Principles of Corporate Finance* (Fifth Edition), 1996, McGraw-Hill, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.
- 2 Brigham, E.F.; and Gapenski, L.C., *Financial Management* (Ninth Edition), 1998, Harcourt Brace College Publishers, 6277 Sea Harbor Drive, Orlando, FL 32887; telephone (800) 245-8744.
- 2 Broverman, S.A., *Mathematics of Investment and Credit* (Second Edition), 1996, Mad River Books (A division of ACTEX Publications), 140 Willow Street, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; e-mail: retail@actexmadriver.com.
- 7C Brown, C.; *Canadian Insurance Contracts Law in a Nutshell*, 1995, Carswell, Attention: Customer and Order Services, One Corporate Plaza, 2075 Kennedy Road, Scarborough, Ontario M1T 3V4, Canada; telephone: (416) 609-3800, or (800) 387-5164; fax: (416) 298-5082; Web site: www.carswell.com.
- 7C Canadian Institute of Actuaries, Secretariat, Suite 820, 360 Albert Street, Ottawa, Ontario K1R 7X7, Canada; telephone: (613) 236-8196; fax: (613) 233-4552; Web site: www.actuaries.ca.

- 5-9 Casualty Actuarial Society *Forum, Foundations of Casualty Actuarial Science* (Third Edition), PCAS, and *Discussion Paper Program*, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org; Web site: www.casact.org.
- 7C Chamber of Commerce of the United States, 1615 H Street, N.W., Washington, DC 20062; telephone: (202) 659-6000 or (800) 638-6582.
- 7US *Contingencies*, American Academy of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173; telephone: (847) 706-3513; fax: (847) 706-3599.
- 9 Cummins, J.D.; Smith, B.D.; Vance, R.N.; and VanDerhei, J.L., *Risk Classification in Life Insurance*, 1983. (Candidates may purchase book from the CAS Office.)
- 1 Edwards, C.H.; and Penney, D.E., *Calculus with Analytic Geometry* (Fifth Edition), 1997, Prentice-Hall, Inc.; telephone: (800) 374-1200 or (515) 284-6751.
- 8 Elton, E.J.; and Gruber, M.J., *Modern Portfolio Theory and Investment Analysis* (Fifth Edition), 1995, John Wiley & Sons, One Wiley Drive, Somerset, NJ 08875; telephone: (800) 225-5945 or (732) 469-4400.
- 7C Ettlenger, K.H.; Hamilton, K.L.; and Krohm, G., *State Insurance Regulation* (First Edition), 1995, Insurance Institute of America, 720 Providence Road, Malvern, PA 19355-0770; telephone: (610) 644-2100.
- 8 Fabozzi, F.J., *The Handbook of Fixed Income Securities* (Fifth Edition), 1997, Irwin McGraw-Hill, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.
- 7C Facility Association, 20 Richmond Street East, Suite 200, Toronto, Ontario M5C 2R9, Canada; telephone: (416) 863-1750, or (800) 268-9572; fax: (416) 868-0894.
- 6 Financial Accounting Standards Board, 401 Merret 7, P.O. Box 5116, Norwalk, CT 06856-5116; telephone: (203) 847-0700.
- 7C *Financial Institutions Act, "Insurance Companies Act," Chapter 47*, The Federal Publication, 388 King Street West, Toronto, Ontario M5V 1K2, Canada, telephone (416) 860-1611.
- 5, 6 *Foundations of Casualty Actuarial Science* (Third Edition), 1996, Casualty Actuarial Society, 1100 N. Glebe Road, Suite 600, Arlington, VA 22201-4798; telephone: (703) 276-3100; fax: (703) 276-3108; e-mail: office@casact.org.
- 1 Ghahramani, S., *Fundamentals of Probability*, 1996, Prentice-Hall, Inc.; telephone: (800) 374-1200 or (515) 284-6751.
- 7C Hall, G.M. (Ed.), *Mercer Handbook of Canadian Pension and Benefit Plans* (Eleventh Edition), 1996, CCH Canadian Limited, 90 Shepherd East, Suite 300, North York, Ontario M2N 6X1, Canada; telephone: (416) 224-2248; fax: (800) 461-4131; Web site: www.ca.cch.com.
- 1 Hassett, M.; and Stewart, D., *Probability for Risk Management*, 1999, ACTEX Publications, 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152, e-mail: retail@actexamdriver.com.
- 5 Head, G.L., *Insurance to Value*, Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, IL 60430.
- 5 Health Insurance Association of America, *Group Life and Health Insurance—Part C* (Third Edition), 1992, HIAA Distribution Center, 9050 Junction Drive, Annapolis, MD 20701; telephone: (800) 828-0111 or (301) 317-4422; fax: (301) 206-9789; Web site: www.hiaa.org.
- 1 Hogg, R.V.; and Tanis, E.A., *Probability and Statistical Inference* (Fifth Edition), 1997, Prentice-Hall, Inc.; telephone: (800) 374-1200 or (515) 284-6751.
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- 8 Hull, J.C., *Options, Futures, and Other Derivatives* (Fourth Edition), 1999, Prentice Hall; telephone: (800) 374-1200;

- 7C L'inspecteur general des institutions financieres, 800, place D'Youville – 8 etage, Quebec PQ G1R 4Y5 Canada; Web site: www.igif.gouv.qc.ca.
- 6, 7C, 7US Insurance Accounting and Systems Association, *Property-Casualty Insurance Accounting* (Seventh Edition), 1998, IASA Fulfillment Center, P.O. Box 51008, Durham, NC 27717; telephone: (800) 817-4272 or (919) 489-0991; fax: (800) 668-4272; Web site: www.iasa.org.
- 7C, 7US Insurance Expense Exhibit, John S. Swift Co., Route 46, Teterboro, NJ 07608; telephone: (201) 288-2050.
- 7C Insurance Information Centre of Canada (formerly the Insurance Bureau of Canada), 240 Duncan Mill Road, Suite 700, Toronto, Ontario M3B 1Z4, Canada; telephone: (416) 445-5912; fax (416) 445-2183.
- 6, 7US Insurance Institute of America, 720 Providence Road, Malvern, PA 19355-0716; telephone: (610) 644-2100; fax: (610) 640-9576.
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- 7US *Journal of Insurance Regulation*, National Association of Insurance Commissioners, 120 W. 12th Street, #1100, Kansas City, MO 64105; telephone: (816) 842-3600.
- 7US *Journal of Risk and Insurance (The)*, American Risk and Insurance Association, The Wharton School, Colonial Penn Center, 3641 Locust Walk, Philadelphia, PA 19104-6218.
- 2 Kellison, S.G., *Theory of Interest*, 1991, Irwin/McGraw-Hill, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.
- 7C Klar, L.N.; Linden, A.M.; Cherniak, E.A.; and Kryworuk, P.W., *Remedies in Tort*, 1997 (Release 6), Volume 4, Carswell, Attention: Customer and Order Services, One Corporate Plaza, 2075 Kennedy Road, Scarborough, Ontario M1T 3V4, Canada; telephone: (416) 609-3800, or (800) 387-5164; fax: (416) 298-5082; Web site: www.carswell.com.
- 3, 4 Klein, J.P.; and Moeschberger, M.L., *Survival Analysis*, 1997, Springer-Verlag New York, Inc., P.O. Box 2485, Secaucus, NJ 07096-2485; telephone: (800) 777-4643; fax: (201) 348-4505.
- 3, 4 Klugman, S.A.; Panjer, H.H.; and Willmot, G.E., *Loss Models: From Data to Decisions*, 1998, John Wiley and Sons, One Wiley Drive, Somerset, NJ 08875; telephone: (800) 225-5945 or (732) 469-4400.
- 2 Landsburg, S.E., *Price Theory and Applications* (Fourth Edition), 1999, International Thompson Publishing, Order Department, P.O. Box 6904, Florence, KY 41022; telephone: (800) 347-7707.
- 7C Linden, A.M., *Canadian Tort Law* (Sixth Edition), 1997, Butterworths, The Butterworths Group of Companies, 75 Clegg Road, Markham, Ontario L6G 1A1, Canada; telephone: (905) 479-2665; fax: (905) 479-2826; Web site: www.butterworths.ca.
- All Mad River Books (A division of ACTEX Publications), 140 Willow Street, Suite One, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152, e-mail: retail@actexamdriver.com.
- 6, 7C, 7US National Association of Insurance Commissioners, 120 W. 12th Street, #1100, Kansas City, MO 64105; telephone: (816) 842-3600.
- 9 National Council on Compensation Insurance, 750 Park of Commerce Drive, Boca Raton, FL 33487; telephone: (800) NCCI-123.
- 7US New York (State) Insurance Department, Publications Unit, Agency Building 1, Empire State Plaza, Albany, NY 12257; telephone: (518) 474-1203.

- 7US New York (State) Laws, Statutes, etc., from New York Insurance Law may be obtained from the West Publishing Company, a division of International Thompson Publishing, Order Department, P.O. Box 6904, Florence, KY 41022; telephone: (800) 347-7707.
- 7C Office of the Superintendent of Financial Institutions Canada, 255 Albert Street, Ottawa, Ontario K1A 0H2 Canada; telephone (613) 990-7788; fax: (613) 952-8219; Web site: www.osfi-bsif.gc.ca.
- 7C Ontario Insurance Commission, 5160 Yonge Street, PO Box 85, North York, Ontario M2N 6L9, Canada; telephone: (416) 250-7250; fax: (416) 590-7070; Web site: www.ontarioinsurance.com.
- 2 Parmenter, M.M., *The Theory of Interest and Life Contingencies with Pension Applications: A Problem-Solving Approach* (Revised Edition), Mad River Books (A division of ACTEX Publications), 140 Willow Street, P.O. Box 974, Winsted, CT 06098; telephone: (800) 282-2839 or (860) 379-5470; fax: (860) 738-3152; e-mail: retail@actexamadriver.com.
- 4 Pindyck, R.S.; and Rubinfeld, D.L., *Econometric Models and Economic Forecasts* (Fourth Edition), 1998, Irwin McGraw-Hill, 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.
- 1, 2, 3, 4 Preliminary Actuarial Examinations. [Contact information to be announced.]
- 7US Rejda, G.E., *Social Insurance and Economic Security* (Sixth Edition), 1999, Prentice-Hall, Inc.; telephone: (800) 374-1200.
- 2 Ross, S.A.; Westerfield, R.W.; and Jaffe, J., *Corporate Finance* (Fourth Edition), 1996, McGraw-Hill Inc., 860 Taylor Station Road, Blacklick, OH 43004; telephone: (800) 262-4729.
- 1 Ross, S.M., *A First Course in Probability* (Fifth Edition), 1998, Prentice-Hall, Inc.; telephone: (800) 374-1200 or (515) 284-6751.
- 3 Ross, S.M., *Introduction to Probability Models* (Sixth Edition), 1997, Academic Press, 6277 Sea Harbor Drive, Attn: Customer Service (Fifth Floor), Orlando, FL 32887; telephone: (407) 345-3800.
- 3, 4 Ross, S.M., *Simulation* (Second Edition), 1997, Academic Press, 6277 Sea Harbor Drive, Attn: Customer Service (Fifth Floor), Orlando, FL 32887; telephone: (407) 345-3800.
- 2, 3 Society of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: www.soa.org.
- 1 Thomas, G.B.; and Finney, R.L., *Calculus and Analytic Geometry* (Ninth Edition), 1996, Addison-Wesley; telephone: (800) 922-0579.
- 2 Wachtel, P., *Macroeconomics*, SoA Study Note 220-28-97, Society of Actuaries, 475 N. Martingale Road, Suite 800, Schaumburg, IL 60173-2226; telephone: (847) 706-3500; fax: (847) 706-3599; Web site: www.soa.org.

KEY DEADLINES

CAS EXAMS 1-4

All correspondence and accompanying forms of payment for Exams 1-4 must reach Preliminary Actuarial Examinations by the stated deadlines. No exceptions will be made.

Spring 2000

RegistrationApril 1, 2000
Change of CenterApril 1, 2000
Refund RequestJune 30, 2000

Fall 2000

RegistrationOctober 1, 2000
Change of CenterOctober 1, 2000
Refund RequestDecember 31, 2000

CAS EXAMS 5-9

All correspondence and accompanying forms of payment for Exams 5-9 must reach the CAS Office by the stated deadlines. No exceptions will be made.

Spring 2000

RegistrationMarch 23, 2000
Change of CenterMarch 23, 2000
Refund RequestJune 30, 2000
Analysis RequestJuly 31, 2000
AppealAugust 31, 2000

Fall 2000

RegistrationSeptember 21, 2000
Change of CenterSeptember 21, 2000
Refund RequestDecember 31, 2000
Analysis RequestJanuary 31, 2001