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CASUALTY ACTUARIAL SOCIETY

ORGANIZED 1914

RECOMMENDATIONS FOR STUDY
(1979 Syllabus of Examinations)



RULES REGARDING EXAMINATIONS FOR ADMISSION
SYLLABUS OF EXAMINATIONS
RECOMMENDATIONS FOR STUDY

OFFICE OF THE SOCIETY

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Twenty-fourth Edition, 1979

Casualty Actuarial Society



One Penn Plaza, 250 West 34th Street, New York, NY 10001 (212) 560-1018

February 22, 1979

Special Notice to Candidates for Examination Parts 3 and 4

The 1980 Syllabus of Examinations will include a restructuring of Parts 3 (Numerical Analysis and Theory of Interest) and Part 4 (Life Contingencies and Operations Research). As the latter exam is normally offered only in the spring, this May will be the last opportunity to take the existing exams in their current configuration. Effective with the May 1980 exams, these parts will be given in both May and November and will be structured as follows:

1980 SYLLABUS

PART 3

A three-hour multiple choice examination will be jointly administered by the Casualty Actuarial Society and the Society of Actuaries.

a) NUMERICAL ANALYSIS

The Syllabus will be the same as that for the current Part 3(a), as set forth on page 10 of the Recommendations for Study, 24th edition, 1979.

b) OPERATIONS RESEARCH

The Syllabus will be revised but the level of difficulty will be equivalent to the current (1979) Part 4(b). The new study material for the 1980 exam will be released in the fall of 1979.

PART 4 (EA-1)

A three-hour multiple choice examination jointly sponsored by the Casualty Actuarial Society, the Society of Actuaries, the American Society of Pension Actuaries and the Joint Board for the Enrollment of Actuaries. This exam will be at the same level of difficulty as the Joint Board's 1977 and 1978 EA-1 Exams. Candidates obtaining a satisfactory score on this exam can receive credit for the first (EA-1) of the two examinations necessary to meet the examination requirements to perform actuarial services under ERISA.

November 1979 Transitional Exams

Part 3	Numerical Analysis Current Part 3(a) Syllabus	1 3/4 hours
Part 4(a)	Compound Interest Current Part 3(b) Syllabus	1 1/4 hours
Part 4(b)	Life Contingencies See Attachment	1 3/4 hours
Part 4 (EA-1)	Compound Interest and Life Contingencies Current Part 3(b) Syllabus for Compound Interest and topics listed on the attachment for Life Contingencies	3 hours

Candidates who are successful on the special November 1979 Numerical Analysis exam will receive credit for the complete Part 3 under the 1980 Syllabus. Parts 4(a), 4(b) and 4 will each provide credit for the corresponding part under the 1980 Syllabus. In November 1979 only, candidates will be permitted to register for one or more of these parts; however, Parts 4(a) and 4(b) will be administered at the same time as Part 4 (EA-1). In 1980, candidates may only register for partial Part 4 examinations if they require that fraction to achieve credit for Part 4 under the 1980 Syllabus.

Further details on the November 1979 examinations will be released at a later date. The purpose of this advance notice is to assist candidates in planning their exam sequence. Background information concerning these changes appeared in the February Actuarial Review.

David P. Flynn
David P. Flynn
Secretary

Attachment to Special Notice to Candidates for
Examination Parts 3 and 4

Part 4B - Life Contingencies
One and three quarters hours
(60% of the three-hour EA-1 Exam)

The general scope of this subject is indicated by the following topics:

Measurement of mortality, including definition and application of standard mortality probability symbols; standard approximations for the evaluation of mortality probabilities for fractional periods; expectation of life (curtate and complete); select, ultimate, and aggregate mortality, central death rates;

life annuities; basic forms, commutation functions, continuous life annuities; life annuities paid more frequently than annually, varying life annuities, and periodic premiums for life annuities;

life insurance; basic forms for single and annual premiums, variations in timing of the payment of premiums and benefits, and insurance and annuity relationships;

net level premium reserves for life insurance and annuities; prospective and retrospective formulas, successive terminal reserves, and reserves at fractional durations;

cash refund annuities, life annuities with a term certain, complete annuities, and retirement income policies;

multiple life functions, joint life probabilities, laws of uniform seniority, and last survivor and general multi-life functions;

multiple decrement functions including associated single decrement tables; the construction of service (multiple decrement) tables from associated single decrement tables, disability functions and secondary decrements;

special pension topics within the mathematics of life contingencies, including salary scales and their application in estimating future salaries and the application of service (multiple decrement) tables in the pension context.

The textbook "Life Contingencies," by C. W. Jordan (1975) is a recommended reference for this subject.

RULES REGARDING EXAMINATIONS FOR ADMISSION

(Effective with May 1979 Examinations)

1. Dates of Examinations

Part	Month
1	May, November
2	May, November
3	May, November
4	May
5	November
6	May
7	November
8	May
9	November
10	May

The Secretary will announce the exact dates on which the examinations will be given. It is customary to hold the examinations in such cities as will be convenient.

2. Filing of Application

a. Parts 1, 2 and 3

A candidate who wishes to take one or more of Parts 1, 2 and 3 must file an application form which may be obtained from the Secretary of the Casualty Actuarial Society. For these Parts, application forms and the appropriate examination fee, in check, draft, or money order made payable to the Society of Actuaries, must be sent to:

Society of Actuaries
208 South LaSalle Street
Chicago, Illinois 60604, U.S.A.

The applications must be received by the Society of Actuaries by March 25 for the May examinations and by September 25 for the November examinations.

b. Parts 4-10

The first time a candidate makes application to take one or more of Parts 4-10, an application obtained from the Secretary of the Casualty Actuarial Society must be filed. Subsequent requests to take other examination can be accomplished by simply writing to the Secretary of the Casualty Actuarial Society, stating the part or parts for which the candidate is applying.

Each request along with the appropriate examination fee, in check, draft, or money order payable to the Casualty Actuarial Society must be sent the Casualty Actuarial Society offices.

For Parts 4-10, applications must be received by the Secretary by April 1 for the May examinations and by October 1 for the November examinations.

3. Joint Administration

Part 1, the General Mathematics examination, Part 2, the Probability and Statistics examination and Part 3, the Numerical Analysis and Theory of Interest examination, are jointly administered by the Casualty Actuarial Society and The Society of Actuaries. Successful candidates will be given credit for these examinations by both Societies.

4. Associateship and Fellowship Examinations

Successful completion of, or credit for, Parts 1 through 7 is required to fulfill the examination requirements for Associateship.

Satisfactory completion of, or credit for, all ten examinations is required to fulfill the examination requirements for Fellowship.

5. Fees

For Parts 1-3, the examination fee at time of publication is \$20 for each Part. Examination fees are payable each time the candidate registers for an examination. Check, draft or money order payable to the order of the Society of Actuaries must be received by the Society by March 25 for the May examinations or by September 25 for November examinations. Late registration will be accepted through April 16 and October 15 if accompanied by a \$25 late registration fee for each Part.

For Parts 4-10, the examination fee at time of publication is \$20 for each Part. Examination fees are payable each time the candidate registers for an examination. Check, draft or money order payable to the order of the Casualty Actuarial Society must be received by the Secretary by April 1 for the May examinations or by October 1 for November examinations. Late registration will be accepted through April 16 and October 15 if accompanied by a \$50 late registration fee for each Part.

6. Refunds and Transfers of Fees

A five dollar service charge will be made on all refund requests and requests to transfer a fee payment from one examination Part to another examination Part.

7. Credit for Examination Parts Under Former Syllabus

A candidate who has passed, or been credited with, one or more of the examinations under the 1978 Syllabus will receive credit for the corresponding examinations of the 1979 Syllabus.

8. Waiver of Examinations for Associateship

Waiver of certain Associateship examinations will be allowed for a candidate who has passed, or been credited with, corresponding examinations for the Society of Actuaries, in accordance with the following:

Casualty Actuarial Society

Part 1

Part 2

Part 3

Society of Actuaries

Part 1, General Mathematics,
passed prior to 1963
(before joint administration)

Part 2, Probability and Statistics,
passed prior to 1966
(before joint administration)

Part 3, Numerical Analysis (or
Finite Differences) and
Theory of Interest (or
Compound Interest) passed
prior to 1975 (before
joint administration)

‡ Candidates who take the Advanced Mathematics Test of the Graduate Record Examinations may apply for credit for Part 1. Credit will be granted if the candidate's score on the Graduate Record Advanced Mathematics Test is equivalent, as determined by the Casualty Actuarial Society, to a passing score on Part 1.

An application to the Casualty Actuarial Society for credit may be submitted either in advance of taking the Graduate Record Advanced Mathematics Test or after taking it. Acceptance of applications submitted more than three years after the test has been taken will be at the discretion of the Education and Examination Committee. The required application form can be obtained from the Secretary's Office. A fee will be required for securing a transcript of the candidate's scores on the test; the fees are explained on the application form.

In recent years there has been an increased emphasis in the Graduate Record Advanced Mathematics Test on more advanced mathematical topics. Consequently, the Education and Examination Committee suggests that candidates plan to obtain credit for Part 1 by writing the Society's examination unless they have already taken the Graduate Record Advanced Mathematics Test for another purpose. Candidates should not attempt the latter test solely for the purpose of receiving credit for the Casualty Actuarial Society examination.

The Casualty Actuarial Society does not offer credit for Part 1 on the basis of scores achieved on the Graduate Record Undergraduate Mathematics Test.

The Board of Directors may waive, subject to such other requirements as it may prescribe, any examination of the Casualty Actuarial Society if the applicant has passed any examination required by another recognized actuarial organization that the Board of Directors deems equivalent to such examination of the Casualty Actuarial Society.

‡ Score - 750

LIBRARY

All candidates registered for the examinations of the Casualty Actuarial Society and all members of the Casualty Actuarial Society have access to all the library facilities. The CAS Library is located at One Penn Plaza, 250 West 34th Street, New York, New York 10001. Phone: (212) 560-1018—(212) 560-1019.

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 a borrower at one time.

Address requests for books to:

Secretary
CAS Library Service
One Penn Plaza
250 West 34th Street
New York, New York 10001

Phone: (212) 560-1018
(212) 560-1019

PROCEEDINGS AND OTHER PUBLICATIONS OF THE SOCIETY

The prices of back numbers of the Proceedings and other publications of the Society and a list of those back numbers still in print are set out in the Year Book of the Society.

Those wishing to purchase these publications should write the Secretary:

Secretary
Casualty Actuarial Society
One Penn Plaza
250 West 34th Street
New York, New York 10001

Phone: (212) 560-1018
(212) 560-1019

AMERICAN ACADEMY OF ACTUARIES

Satisfactory completion of specified examinations of the Casualty Actuarial Society will satisfy the educational requirements of the American Academy of Actuaries. For further information contact the Academy at 208 South LaSalle Street, Chicago, Illinois 60604.

1979 SYLLABUS OF EXAMINATIONS

Associateship Examinations

<u>Part</u>	<u>Time Allowed</u>	<u>Subjects</u>
1*	3 hours	General Mathematics
2*	3 hours	Probability and Statistics
3*	3 hours	Numerical Analysis and Theory of Interest
4	3 hours	a) Life Contingencies b) Operations Research, Decision Theory, Data Processing
5	3 hours	Principles of Economics, Theory of Risk and Insurance Forms, Coverages, Underwriting, Product Design, Marketing
6	4 hours	Principles of Ratemaking and Data for Ratemaking
7	4 hours	Insurance Accounting and Expense Analysis Premium, Loss, and Expense Reserves

Fellowship Examinations

8	3 hours	Insurance Law, Supervision and Regulation, and Statutory Insurances
9	4 hours	Advanced Ratemaking, and Individual Risk Rating
10	3 hours	Operations of Insurance Companies, Reinsurance and Excess Rating, Forecasting, and Current Events and Issues

*Jointly administered with the Society of Actuaries

RECOMMENDATIONS FOR STUDY

The objective of the Casualty Actuarial Society's education and examination process is to assist the candidate in professionally preparing for an actuarial career of managing the varied corporate responsibilities assigned to an Actuary in the casualty insurance field. The Recommendations For Study presents the study material that a casualty actuarial candidate 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 syllabus readings and study materials.

The examinations for admission to the two grades of membership in the Society are designed to establish the qualifications of candidates. The following Recommendations for Study are provided as a guide for the candidates in their preparation for the examinations. It should be realized that although the examination questions will be based upon the textual material cited, they will not necessarily be drawn directly therefrom. The examinations will test not only the candidate's knowledge of the subject matter, but also the candidate's ability to apply that knowledge. Finally, in the development of the syllabus readings and the examination questions, it is assumed that the candidate is familiar with the material covered in earlier parts. Therefore, it is recommended that the candidate take the parts in numerical order.

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 principles and methods to specific problems. The questions on the examinations for Parts 1, 2, and 3 are all of the multiple choice type.

In preparing for Parts 7 through 10, the candidate should become familiar with current developments by reading regularly at least two general insurance periodicals.

The references to papers in the Proceedings of the Casualty Actuarial Society are considered to include all discussions of these papers, though the page references cited refer to the papers only. In the case of readings from out-of-print Proceedings, the candidate is responsible only for those discussions reprinted in the CAS booklets referred to below.

A more detailed reference of the texts cited will be found in the Index To Readings at the end of these Recommendations. The reading material suggested in these Recommendations is designed to acquaint the candidate with the respective subjects and should not be interpreted as representing views endorsed by the Casualty Actuarial Society.

Study notes and study kits have been prepared to assist the candidate in connection with some examinations and can be obtained from the Secretary's office at the following costs:

Study Kit	Cost
Part 6	\$10.00
Part 7 <i>Current Articles</i>	4.00
Part 9a	4.00
Study Note	
Part 9b & 10 <i>Snader</i>	1.00

Readings from out-of-print Proceedings of the Casualty Actuarial Society are available from the Secretary's office as follows:

Part Booklet	Cost
6	\$ 3.00
7 & 9a	3.00
8	3.00
9b	5.00

Sample examination questions for Parts 1-3 and copies of Parts 4-10 examinations for recent years may be obtained from the Secretary. Also available without charge from the Secretary is a note entitled "Hints on Study and Exam Techniques."

Other material available for a charge from the Casualty Actuarial Society office:

Wagner-Answer Books (Part 4).....	\$ 3.00
The Pricing and Marketing of Insurance (Part 8).....	2.00
Post-Assessment Property and Liability Insurance Guaranty Fund (Part 8).....	2.00
ISO Commercial Fire Rating Schedule (Part 9).....	2.00
Casualty Contingencies Chapters (\$2.00 per Chapter) (Part 10).....	2.00
New York Insurance Department Examination of Insurance Companies (Part 7).....	4.00 Cost to be determined

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Fellow gets part 4

as of 1980 - SoA part 4 get CAS part 4

ASSOCIATESHIP

PART 1

GENERAL MATHEMATICS

This Examination Part is jointly administered by the Casualty Actuarial Society and the Society of Actuaries.

This three-hour multiple-choice examination is based on material usually covered in undergraduate mathematics courses through the differential and integral calculus. The general scope of the examination is indicated by the following topics:

Real and complex numbers; the binomial theorem; elementary set theory, including unions, intersections, and complements; functions; equations and inequalities; analytic geometry of two and three dimensions; systems of linear equations; standard algebraic and transcendental functions, including polynomial, rational, trigonometric, logarithmic, and exponential functions; limits, continuity, differentiability, and integrability; derivatives, integrals, and partial derivatives; the fundamental theorem of integral calculus; applications of derivatives and integrals, including multiple integrals, finite and infinite sequences and series, including the Taylor series expansion; the mean value theorem; linear equations; vector spaces; generating sets; bases; dimension; subspaces; scalar products; orthogonality; linear transformations; kernel and image space; matrices; determinants; eigenvectors and eigenvalues.

Candidates who have not had mathematics courses covering these topics may be helped by any one of the four texts covering calculus and analytic geometry and any one of the three texts covering linear algebra listed below. These may be considered representative of the many texts used in colleges and universities in the United States and Canada which adequately cover the material upon which the candidate may be examined.

Thomas, G. B. (Jr.) *Calculus and Analytic Geometry*. (Fourth Edition).

Johnson, R. E. and Kiokemeister, F. L. *Calculus with Analytic Geometry*, (Fourth Edition).

Protter, M. H. and Morrey, C. B. (Jr.) *College Calculus with Analytic Geometry*. (Second Edition).

Purcell, E. J. *Calculus with Analytic Geometry*.

Curtis, Charles W. *Linear Algebra, and Introductory Approach*.

Lang, Serge. *Linear Algebra*. (Second Edition). Chapters 1-7, 9.

Bradley, Gerald L. *A Primer of Linear Algebra*. Chapters 1-6.

An additional reference for those who may want further practice in solving linear algebra problems is *Linear Algebra* by Seymour Lipschutz (Schaum's Outline Series, McGraw-Hill).

PART 2

PROBABILITY AND STATISTICS

This Examination Part is jointly administered by the Casualty Actuarial Society and the Society of Actuaries.

This three-hour multiple-choice examination is based on material usually covered in undergraduate courses in mathematical probability and statistics. It can be taken by college students who have had a thorough course in these subjects or by persons who have done concentrated reading in these fields. The general scope of the examination is indicated by the following topics, which are among those proposed for a one-year college course in probability and statistics by the Committee on the Undergraduate Program in Mathematics (CUPM) of the Mathematical Association of America:

Sample spaces; axioms and elementary theorems of probability; independence, conditional probability, and Bayes' theorem; permutations and combinations; random variables; binomial, Poisson, normal, and other probability distributions; expectation, mean, variance, and moment generating functions of probability distributions; multivariate distributions; transformations of random variables; conditional and marginal distributions; Chebyshev's inequality, law of large numbers, central limit

theorem; point estimation, including maximum likelihood estimation and the application of criteria such as consistency, unbiasedness, and minimum variance; tests of statistical hypotheses, including power functions, Type I and Type II errors, Neyman-Pearson lemma, and likelihood ratio tests; applications of sampling distributions, such as the normal, chi-square, F, and Student's *t* distributions, to confidence intervals and to tests for means and variances; regression and correlation; random sampling and randomization techniques; interpretation of experimental results; Bayesian estimation.

The CUPM has reported that statistics courses can be implemented in a variety of ways, and can include different topics with different emphases on topics. That widely divergent approaches are acceptable is illustrated by the many texts appropriate for a one-year college course. Among such texts, the following are representative of those which cover most of the above topics and which provide the mathematical background required for this examination.

Hogg, R. V. and Craig, A. T. *Introduction to Mathematical Statistics*. (Fourth Edition).

Hoel, P. G., Port, S. C. and Stone, C. J. *Introduction to Probability Theory and Introduction to Statistical Theory*.

Mood, A. M., Graybill, F. A., and Bees, D. C. *Introduction to the Theory of Statistics*. (Third Edition).

DeGroot, Morris H. *Probability and Statistics*.

Candidates who have mastered the text material and can work the problems in any one of these references should be adequately prepared to handle the mathematical material in this examination.

The following page references to the representative texts listed above are provided to assist candidates in locating some of the appropriate background material for a few of the selected topics that are included in this examination:

Moment generating functions of probability distributions:

1. Pp. 50-57, 91-92, 101, 105-107, 110-111, 119-120, 164-169.
2. Pp. 197-200 (Volume I).
3. Pp. 78-81, 538-543.
4. Pp. 162-167, 201, 208-209, 214-215, 219, 237-238.

Applications of chi-square distribution (chi-square tests):

1. Pp. 269-283, 312-313.
2. Pp. 91-99 (Volume II).
3. Pp. 440-461.
4. Pp. 438-461.

Applications of F distributions (mainly analysis of variance):

1. Pp. 282-288, 291-296.
2. Pp. 127-133, 140-148, 157-162 (Volume II).
3. Pp. 437-440.
4. Pp. 423-428, 538-552.

Regression and correlation:

1. Pp. 73-78, 117-120, 296-303.
2. Pp. 99-100 (Volume I), 33, 111-119, 148-153 (Volume II).
3. Pp. 155-159, 161, 167-169, 482-502.
4. Pp. 172-182, 507-535.

Bayesian estimation:

1. Pp. 227-233.
2. Pp. 36-42 (Volume II).
3. Pp. 339-350, 396-398.
4. Pp. 275-283.

An additional reference, for candidates who may wish further practice in solving problems, is Spiegel, M. R., *Theory and Problems of Statistics* (Schaum's Outline Series, McGraw-Hill). A second additional reference, for candidates who may wish to acquire further insight into the underlying nature of statistics and exposure to statistical applications is Tanur, Mosteller, et al, *Statistics: A Guide to the Unknown*. (Holden-Day), available in paperback form.

It will be assumed that the candidate is familiar with the ordinary deck of fifty-two playing cards and the ordinary six-faced die.

PART 3

NUMERICAL ANALYSIS AND THEORY OF INTEREST

This Examination Part is jointly administered by the Casualty Actuarial Society and the Society of Actuaries.

This three-hour multiple-choice examination covers the two separate subjects of numerical analysis and theory of interest. Students must demonstrate knowledge of both subjects to receive credit for the examination. The examination is based on the material in the two textbooks listed below.

a) NUMERICAL ANALYSIS

This subject encompasses various techniques for handling numerical data. Although many of the principles dealt with lend themselves readily to computer procedures and methods, knowledge of such procedures or methods is neither presupposed nor required for the examination.

The general scope of the numerical analysis section of the examination is indicated by the following topics:

Finite differences; interpolation with equal and unequal intervals; central differences; summation; numerical methods of integration and differentiation; difference equations; successive approximation or iterative techniques; numerical methods of handling matrices and determinants; numerical approaches to linear systems of equations.

Kellison, S. G. *Fundamentals of Numerical Analysis*. Chapters 1-6, 7 (Sections 1-5), 8 (Sections 1-4 and 6-8), 9 (Sections 1-3), 11, and 13 (Sections 1-6).

b) THEORY OF INTEREST

The general scope of this subject is indicated by the following topics:

Measurement of interest; accumulation and discount; present value; forces of interest and discount; equations of value; annuities; perpetuities; amortization and sinking funds; yield rates; bonds and other securities; installment loans; depreciation, depletion, and capitalized cost.

The emphasis is primarily on problem solving and secondarily on theoretical considerations. Recourse is made, as needed, to methods from the calculus and classical algebra in order to present a broad perspective of both the practical and the theoretical aspects of this subject. The candidate will also be expected to be able to apply elementary numerical analysis techniques in solving some problems. Basic computations are made by reference to standard tabulated interest functions, which are printed in the examination book. A copy of these functions will be sent upon request of the candidate to the Secretary at the Society's office.

Kellison, S. G. *The Theory of Interest*.

In addition to a thorough knowledge of this text, the candidate is expected to have worked the problems at the end of each chapter.

For many candidates, Part 3 is the first actuarial examination for which they will be preparing without the benefit of a formal course in the subject material. These candidates will find it helpful to maintain contact with other Part 3 candidates and to take advantage of opportunities to discuss with others questions that are considered difficult. Candidates should not hesitate to consult members of the profession in their own organizations or elsewhere who are knowledgeable on these subjects.

The examinations are drafted by the Part 3 Committee with the intention of testing the candidate's knowledge of the subject matter included in the texts, and every effort is made to ensure that the questions fall within the scope of the texts. Trick questions are deliberately avoided, and the wording of each question is considered carefully to eliminate possible ambiguities. Each Part 3 examination is thoroughly reviewed in relation to all these factors by Officers of the Education and Examination Committees of both the Casualty Actuarial Society and the Society of Actuaries.

The Part 3 examinations are not published. However, a set of illustrative questions may be obtained by candidates applying for the examination by writing the Secretary at the Casualty Actuarial Society's office. Future examinations may vary somewhat from this set of questions as to the proportion of questions of various styles and subjects; new forms of questions may appear from time to time; and the total number of questions may be increased or decreased. After having covered the study material thoroughly, candidates may wish to test themselves individually by trying to answer the illustrative questions within the indicated allotted time. Such a test will not only provide practice in answering multiple-choice questions but may also indicate areas requiring further work and study.

PART 4

Prior to commencing study for this Part, the candidate should read the "Recommendations for Study" section, pages 6 and 7, for study suggestions and guidance in obtaining study notes, out-of-printing readings, past examinations, and other information important to sitting for this examination.

NOTE: Although passing of this Part will be determined on the candidate's overall performance, Parts a and b will be graded separately and a minimum competence must be demonstrated in each Part.

(a) LIFE CONTINGENCIES

Life Contingencies is the first examination dealing with an insurance subject. This section encompasses the application of probability and interest theory to the contingency of human life. The intent of the section is to provide the candidate with a basic theoretical foundation and general background in handling long-term contingencies. Although many casualty risks are short term in nature, the knowledge of life contingencies should prove useful directly or indirectly in many non-life applications. The Ferguson reading on workers' compensation reserving is an example of a direct application of life contingencies to a Casualty Problem.

The candidate should understand the ideas underlying the formulas and derivations rather than relying solely on memorization. The candidate should also have a thorough knowledge of actuarial notation, the definitions of actuarial functions, the relationships between various actuarial functions, and the application of the various formulas.

It is important for the candidates to test their comprehension of the material at frequent intervals by solving problems. Many examination questions will be similar to the exercises following the readings. Questions may be of the short-answer, true-false, multiple choice or longer numeric type questions.

✓ Jordan, C. W. *Life Contingencies*. 1967. Chapters 1 (omitting Section 5), 2 (omitting Section 6), 3, 4 (omitting Sections 2 and 3), 5 (omitting Sections 6, 7, 8 and 11), 6 (omitting Sections 4 and 5), 7 (Sections 1, 2 through formula 7.1 and 3 through formula 7.7 only), 8 (Section 3 only), 9 (Sections 1, 2 and 3 only).

✓ Ferguson, R. E. "Actuarial Note on Workmen's Compensation Loss Reserves." *PCAS LVIII*, 1971.

(b) OPERATIONS RESEARCH, DECISION THEORY, DATA PROCESSING

Operations research originated in World War II to help solve operational military problems. Scientists from a variety of disciplines formed teams to attack particular problems. Operations research, known also as management science, is now widely accepted in industry. Specific mathematical techniques have been developed and utilized extensively. While these

techniques provide powerful tools for solving problems, they are the *products* of operations research and not operations research itself. The importance of the operations research discipline derives from the quantitative approach to real life problems. Often a manipulative model will be created (either deterministic or stochastic).

To repeat, the purpose of studying operations research is more to learn the discipline of creative quantitative approaches to problems, than to learn specific techniques. Decision theory can be validly classified as a specific operations research discipline. Similarly, Actuarial Science itself may be thought of as a specific area of operations research.

It is not expected that this syllabus part will make the candidate an expert in operations research and its existing techniques or in decision theory. Rather, it is designed to introduce the candidate to the topics much as a short course might. As there are usually several ways to approach a quantitative problem, a familiarity with a variety of techniques can help the actuary in selecting one suited to a particular problem or to develop a new technique. In some cases, it may be appropriate to seek guidance from operations research practitioners who are expert in specific techniques.

(1) *Operations Research*

The introduction to operations research is accomplished by a further exposure to the nature of operations research (Ackoff and Rivett), an exposure to some specific techniques (Wagner) and an example of an application to an insurance problem (Cozzolino and Freifelder).

The candidate should be able to demonstrate an understanding of the theory and techniques of operations research as presented in the syllabus material. The candidate may expect mathematical questions based upon any part of the syllabus—including questions which are extensions of the logical thinking process inherent in operations research. However, in the material identified by asterisks, the candidate will not be required to reproduce mathematical formulae.

✓ Ackoff, R. L. and Rivett, P. *A Managers Guide to Operations Research*. 1963 (John Wiley and Sons, New York)—Preface plus Chapters 1, 2, 3.

✓ Wagner, H. M. *Principles of Operations Research*. Second edition 1975.

Chapters 1*, 2, 3 (Sections 3.1-3.4) 4 (Sections 4.1-4.4), 5 (Sections 5.1-5.7)*, 8 (Sections 8.1-8.2), 11 (Sections 11.1-11.2)*, 16 (Sections 16.1-16.3), 16 (Sections 16.4-16.5)*, 20 (Sections 20.1-20.6)*, 21 (Sections 21.1-21.4)*, 22*.

✓ NOTE: Answer books to Wagner text are available from the Casualty Actuarial Society office for \$3.00 each.

✓ Cozzolino and Freifelder. "Underwriting Individual Drivers: A Sequential Approach"* *PCAS LX*, 1973, p. 63.

* Sections for which the candidate will not be required to reproduce mathematical formulae.

(2) *Decision Theory*

Complex mathematical or theoretical questions will not be asked. However, the candidate should be sufficiently familiar with the material to formulate the solutions to problems using the decision theoretic approach and carry simple problems through to solution. The emphasis will be on the use of the technique, as well as a knowledge of the various possible refinements presented. For the following study text, the candidate should acquire a detailed knowledge of Chapters 1 through 3, and have a general knowledge of Chapters 4 through 6 and the preface and introduction insofar as the material may apply to the formulation of solutions to problems.

✓ Raiffa, H. *Decision Analysis—Introductory Lectures on Choices Under Uncertainty*. Preface, Introduction and Chapters 1 through 6.

(3) *Data Processing*

Computer usage is an integral part of the everyday work of the typical actuary. The syllabus material has been selected with an eye to giving the candidate a good overview of information systems and computers. The perspective is that of a user or manager, as opposed to a programmer. The candidate should expect questions requiring an understanding of all the syllabus material, and also questions requiring a knowledge and understanding of the vocabulary used. Recitation of specific numerical characteristics of various equipment will not be required.

✓ Burch, J. G. (Jr.) and Strater, F. R. (Jr.) *Information Systems: Theory and Practice* (John Wiley and Sons, Inc., New York 1974) Chapters 4, 6, 8, 13 (Sections 13.1-13.3) 14, 15, Appendix B.

Questions on part 4b will be both short answer and longer essay type questions.

PART 5

Prior to commencing study for this Part, the candidate should read the "Recommendations for Study" section, pages 6 and 7, for study suggestions and guidance in obtaining study notes, out-of-printing readings, past examinations, and other information important to sitting for this examination.

Section (a) of this examination deals with the basic principles of economics and with the theory of risk and insurance. Section (b) covers the insurance product, that is, the policy forms and coverages and their delivery to the consumer (insured) via the underwriting, product design and marketing functions.

(a) **PRINCIPLES OF ECONOMICS, THEORY OF RISK AND INSURANCE**

The candidate will need to have a knowledge of the principles of economics at the college level. The candidate should be familiar with the various key concepts and basic principles of economics included in the recommended reading and be able to explain and apply them. The candidate should know what risk is, the kinds of risk and the ways in which they can be handled, with particular emphasis on its relation to insurance.

(b) **FORMS, COVERAGES, UNDERWRITING, PRODUCT DESIGN, MARKETING**

(1) *Policy Forms and Insurance Coverages*

The insurance policy is the contract describing the services and protection which the insurance company is providing to the insured. It is, in effect, the only "product" which the insurance buyer receives until the time a loss occurs. The candidate should know the policy provisions and the bases of exposure used in the respective lines of insurance, with emphasis on basic coverages and features common to all lines as well as those peculiar to specific lines or types.

(2) *Underwriting*

Underwriting is a key function in the insurance business with unique qualities which make it critical to the success of the endeavor. The actuary will usually be working closely with the underwriter in his day-to-day operations. The candidate should know what the underwriting function is—its basic purpose, principles and activities.

(3) *Product Design and Marketing*

Product design and product modification are areas of an insurance company's operations in which the actuary may become involved. For the insurance companies, the product is the policy itself and the service (the indemnity of loss) it provides. A line of insurance may be thought of as a "product line," with the various policy forms within the line as constituting individual products. The candidate is expected to gain an understanding of marketing concepts, particularly those related to market research, product design and development. He

should be prepared to discuss the application of marketing concepts to the insurance process and product. As the text referenced below does not deal directly with insurance, the candidate may omit the questions, problems, case histories and appendix. The examination questions will not require that the candidate be able to reproduce specific facts or details from the text, rather they will test his ability to apply the general concepts to insurance problems.

(a) **PRINCIPLES OF ECONOMICS, THEORY OF RISK AND INSURANCE**

In studying the following references it is recommended that they be read in the order listed:

- ✓ Samuelson, P. A. *Economics*. 1976. Chapters 1-4, 6, 10-15, 18-20, 21 (Appendix only), 22-26, 30, 31, 33.
- ✓ Kulp, C. A. and Hall, J. W. *Casualty Insurance*. 1968. Chapters 1 and 18.
- ✓ Bickelhaupt, D. L. *General Insurance*. 1974. Chapters 1, 2, 4.
- ✓ Houston, D. B. "Risk, Insurance, and Sampling." *The Journal of Risk and Insurance*. Vol. XXXI, No. 4, p. 511.

(b) **FORMS, COVERAGES, UNDERWRITING, PRODUCT DESIGN, MARKETING**

(1) *Policy Forms and Insurance Coverages*

The manual sections listed should be studied as illustrative of the part played by manuals in the forms and coverages area. Where separate manuals are published by states, use a typical state.

Policy provisions change from time to time so that it is essential to supplement the cited texts by study of the contracts currently in use. The candidate will be held responsible for knowledge of the following policy forms (not the associated endorsements): Personal Auto, Homeowners, Workers' Compensation. Current insurance contracts will be considered to be those in the book or kit of sample policies cited herein.

Certain of the references encompass material beyond the scope of this subsection, that is, the determination of manual or class rates and individual risk rating plans. The examination for this sub-section will not reflect such material.

- ✓ Kulp, C. A. and Hall, J. W. *Casualty Insurance*. 1968. Chapters 2-10 and 14.
- ✓ Bickelhaupt, D. L. *General Insurance*. 1974. Chapters 5, 18, 19, 20, 26, 27, 14, 15 and Appendix C.
- ✓ Eilers, R. D. and Crowe, R. M., Eds. *Group Insurance Handbook*. 1965. Chapters 3, 5, 6, 25 and 39.
- ✓ Head, G. L. *Insurance to Value*. 1971. Chapters 3 and 4.

Alliance of American Insurers.

Study Kit of Policies, Forms and Endorsements—Casualty, Fire, Marine and Life. 1979 Edition.

NOTE: A review of the National Underwriter Company's *The Fire, Casualty and Surety Bulletins*, or *Broadened Protection for Personal and Business Risks*, current edition, may be helpful to the candidate in preparing for this section although examination questions will not be derived from these sources. The latter consists of pages from the F.C. & S. Bulletins.

Insurance Services Office.

Private Passenger Automobile Manual. General Rules. pp. 1-27.

Homeowners 76 Program Manual. General Rules. pp. 1-6.

Commercial Lines Manual. Common General Rules. pp. CGR 1-2. General Liability. pp. GL 1-13.

National Council on Compensation Insurance.

Basic Manual of Rules, Classifications and Rates for Workmens' Compensation and Employers' Liability Insurance. General Rules. pp. R1-R27.

* Publisher has a supply of 1974 addition. 312. 798 - 6000

(2) *Underwriting*

The candidate may find it helpful to do the readings in this section in conjunction with those in the prior section. In particular, the *Readings in Underwriting* text was designed to be read along with texts in general insurance, providing both introductory and supplementary material on major insurance lines.

✓ Kulp, C. A. and Hall, J. W. *Casualty Insurance*. 1968. Chapter 11.

✓ Bickelhaupt, D. L. *General Insurance*. 1974. Chapter 7.

✓ Head, G. L. *Insurance to Value*. 1971. Chapters 5 and 9.

Readings in Underwriting. 3rd Edition. The American Institute. (Specialization Book under references for CPCU II). Copyright 1975.

(3) *Product Design and Marketing*

The chapter and page references set forth in the following paragraphs are to Stanton, William J. *Fundamentals of Marketing*. (Fifth Edition). 1978.

For candidates with some prior background in marketing, the following general plan of study is suggested.

- (1) Chapter 21, "Marketing of Services," pages 481-496, explains how the marketing of a service, such as insurance, is different from the traditional marketing approach applied to goods.
- (2) Chapter 9, "Product-Line Policies and Strategies," pages 196-206, should be read bearing in mind that an insurance line of business is analogous to a product line. The sections on product mix, product differentiation and market segmentation have direct application to the insurance situation.
- (3) Chapter 8, "Product Planning and Development," pages 177-194, is a key chapter in that actuaries frequently play a role in the product design or alteration in an insurance company. Examples of new insurance products include no-fault automobile coverage, the Businessowners Policy and the Homeowners 76 program. In thinking of applications of this chapter to insurance, the candidate should consider what insurance products fall into each of the three categories of new products and applicability of the steps in the development process of a new product to insurance.
- (4) Chapter 3, "A Marketing Information System and Marketing Research," pages 38-61, has been included primarily so that the candidate will gain an understanding of means of gathering marketing information and carrying out a market research investigation. The activities are, of course, directly related to product development.

Candidates who do not have a background in marketing should review chapters 1, 2, 4, 5, 6 and 7 of the text before beginning the chapters listed above. The introductory chapters are necessary for an understanding of the above: however, the examiners will *not* draw any questions from these six chapters.

Since questions will deal with the applicability of certain marketing considerations to insurance products, it is suggested that the candidate first complete all (or most) of the readings (in the first two sections of this exam) dealing with insurance policy forms and coverages before starting the marketing readings.

PART 6

Prior to commencing study for this Part, the candidate should read the "Recommendations for Study" section, pages 6 and 7, for study suggestions and guidance in obtaining the study kit, out-of-printing readings, past examinations, and other information important to sitting for this examination. References are listed in the suggested order for study. The "Study Kit on Ratemaking Developments", listed for both Parts (a) and (b), should be studied in conjunction with several of the individual readings included in the Syllabus. For example, the Fire and Extended Coverage ratemaking sections be read along with the Hurley paper, and the section on statistical plans should be studied before reading the individual plans.

(a) PRINCIPLES OF RATEMAKING

Section (a) contains readings which describe ratemaking concepts in broad, general principles as well as in specific detail for many lines of insurance. Certain general subjects of particular importance, such as credibility theory, classification and individual risk ratemaking, trend and loss development factors, and liability increased limits ratemaking are addressed in separate papers.

A candidate for this examination should have a thorough understanding of the general, basic principles of ratemaking such that he/she can analyze data given, select an appropriate ratemaking technique and develop a solution to a numerical problem. In addition, the candidate should be familiar with the ratemaking techniques presented in the readings, being able to compare and discuss why certain procedures are applicable to individual lines of insurance, as well as to work numerical problems.

The candidate should also be prepared to discuss specialized concepts in ratemaking, such as trend and loss development, and consider their relationship to changes in the economic environment.

The candidate is not responsible for current, specific developments in ratemaking procedures. However, a study kit is provided which contains portions of recent rate filings along with pertinent explanatory memoranda. This information is provided so the candidate will be aware of certain current techniques not covered in the various readings. The candidate will not be required to reproduce detailed procedures from the study kit unless specifically noted in the preface to the study kit. The candidate, however, will be responsible for a general understanding of the types of techniques, their application, and how they relate to changes in the economic and social environment.

The following list of topics is typical of those a candidate should be prepared to discuss:

1. The selection and evaluation of ratemaking technique corresponding to the characteristics of a given line of insurance.
 - a. pure premium versus loss ratio,
 - b. calendar year versus accident year versus policy year,
 - c. credibility, and
 - d. territorial and classification relativities.
2. Methods for trending and projecting losses and premiums (when appropriate).
 - a. internal versus external indices,
 - b. relation to loss development,
 - c. claim cost projection versus current cost index approach, and
 - d. impact of deductibles, coinsurance and insurance to value programs.
3. The candidate should also be prepared to discuss and apply ratemaking principles to problems which may not have generally recognized solutions.

- ✓ Michelbacher, G. F. and Roos, N. R. *Multiple-Line Insurers: Their Nature and Operation*. 1970. Chapters 2, 3.
- ✓ Kulp, C. A. and Hall, J. W. *Casualty Insurance*. 1968. Chapters 11 (pp. 373-375, 386-411 only), 19-22.
- ✓ Dorweiler, P. "Notes on Exposures and Premium Bases." *PCAS XVI*, 1929. p. 319 or *PCAS LVIII*, 1971. p. 59.
- ✓ Miller, D. L. and Davis, G. E. "A Refined Model for Premium Adjustment." *PCAS LXIII*, 1976. p. 117.
- ✓ Longley-Cook, L. H. *An Introduction to Credibility Theory*. 1962. (Available from CAS office at cost of \$1.50)
- ✓ Kallop, R. "A Current Look at Workers' Compensation Ratemaking." *PCAS XLII*, 1975. p. 62.
- ✓ Fratello, B. "The Workmen's Compensation Injury Table and Standard Wage Distribution Table—Their Development and Use in Workmen's Compensation Ratemaking." *PCAS XLII*, 1955. p. 110.
- ✓ Stern, P. K. "Ratemaking Procedures for Automobile Liability Insurance." *PCAS LII*, 1965. p. 139.

- ✓ Lange, J. T. "General Liability Insurance Ratemaking." *PCAS LIII*, 1966. p. 26.
- ✓ Newman S. H. "Burglary Insurance Ratemaking." *PCAS LIII*, 1966. p. 312.
- ✓ Brannigan, J. F. "Current Ratemaking Procedures in Boiler and Machinery Insurance." *PCAS LIII*, 1966. p. 248.
- ✓ Hurley, R. L. "Commercial Fire Insurance Ratemaking Procedures." *PCAS LX*, 1973. p. 208.
- ✓ Walters, M. A. "Homeowners Insurance Ratemaking." *PCAS LXI*, 1974. p. 15.
- ✓ Cook, C. F. "Trend and Loss Development Factors." *PCAS LVII*, 1970. p.1.
- ✓ Head, G. L. *Insurance to Value*. 1971. Chapters 1, 2, 6-8, and Appendices 1-4.
- ✓ Lange, J. T. "The Interpretation of Liability Increased Limits Statistics." *PCAS LVI*, 1969. p. 163.
- ✓ Bartleson, E. L. *Health Insurance Provided Through Individual Policies*. 1968. Chapters 4-7 and Appendices 1 and 4.
- ✓ MacIntyre, D. M. *Voluntary Health Insurance and Rate Making*. 1962. Chapters 2, 3 and 5.
- ✓ Eilers, R. D. and Crowe, R. M., Eds. *Group Insurance Handbook*. 1965. Part IV, Chapters 16-22.

"Study Kit on Ratemaking Developments." (Available from the CAS office at the cost of \$10.00) *update.*

(b) **DATA FOR RATEMAKING**

Section (b) includes readings which cover the planning and use of internal statistical material, the compilation and presentation of insurance statistics for administrative and ratemaking purposes, and the sources and uses of external statistics, particularly as they may be required in insurance administration and ratemaking.

The candidate should be familiar with the data captured in the individual statistical plans, being able to compare the different plans, noting limitations and possible areas of improvement. The relationship to the various ratemaking techniques should be noted.

✓ Kimball, S. L. and Denenberg, H. S., Eds. *Insurance, Government and Social Policy*. 1969. Chapter 13. (Not including Appendix.)

✓ Masterson, N. E. "Economic Factors in Liability and Property Insurance Claim Costs, 1935-1967." *PCAS LV*, 1968. p. 61.

Insurance Services Office. *Automobile Statistical Plan*.

Insurance Services Office. *Commercial Statistical Plan*.

Insurance Services Office. *Personal Lines Statistical Plan for Homeowners Policies, Mobilehomes Policies, Comprehensive Dwelling Policies, Dwelling Policies*.

National Council on Compensation Insurance. *Workmen's Compensation Unit Statistical Plan Manual*.

"Study Kit on Ratemaking Developments." (This is the same study kit as required for Part (a).)

PART 7

Prior to commencing study for this Part, the candidate should read the "Recommendations for Study" section, pages 6 and 7, for study suggestions and guidance in obtaining study notes, out-of-printing readings, past examinations, and other information important to sitting for this examination.

Section (a) of this examination deals with the form, content and interpretation of the two major reports an insurance company makes to regulatory authorities, and with sources of comparative data. Section (b) deals with the analytical techniques which an actuary may employ to develop certain of the data required for these reports.

(a) *Insurance Accounting and Expense Analysis*

The candidate should obtain a general knowledge of insurance accounting, including its terminology and practice. The candidate should have detailed familiarity with the contents, purpose, and recent changes in the Annual Statement Blank and the Insurance Expense Exhibit. This includes a knowledge of the methods of preparation and interrelationships of the various exhibits, schedules, and parts comprising these reports. The candidate should understand the details of and reasons for the differences between the accounting methods employed in these reports and those of normal business accounting. The candidate should also understand the differences between the statistics included in these reports and those used for ratemaking and the various types of experience analysis. The candidate 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.

(b) *Premium, Loss and Expense Reserves*

An actuary may be expected by an employer to design and test reserving methods, and complete Schedules O and P of the Annual Statement. The candidate 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
 - c. For all incurred claims
2. 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
3. Special reserving problems in a line arising from:
 - a. Catastrophe losses
 - b. Reopened claims
 - c. Policies on a claims-made rather than occurrence basis
 - d. Fidelity and Surety IBNR
 - e. Credit insurance
4. The unearned premium reserve:
 - a. Improving its accuracy
 - b. The reserve for retrospective returns
 - c. Policies on a claims-made basis
 - d. Deposit premiums policies
5. Allocated expense reserves.
6. Unallocated loss expense reserves.
7. Evaluating the adequacy of current loss and loss expense reserve levels.
8. Statutory Annual Statement reserves.

The candidate should also be familiar with current developments in the above areas.

The candidate should be prepared to compare and evaluate the procedures discussed and the arguments advanced in the readings. The answers provided by the candidate will be graded based on their applicability to the specific problem presented and the professional competence evidenced by the answer. While the readings for this part provide the basic factual information necessary, practical experience has often proven helpful in successfully completing the examination.

(a) **INSURANCE ACCOUNTING AND EXPENSE ANALYSIS**

National Association of Insurance Commissioners. *Proceedings*. Blanks Committee (A-1) Reports for years 1974 through Volume I 1979 as applicable to the Fire and Casualty Blank.

(1) *Insurance Accounting*

- Association Form of 1978 Annual Statement Blank for Fire and Casualty Companies including the attending instructions (both individual and consolidated basis).
- ✓ Strain, R. W. *Property-Liability Insurance Accounting*. 1974 or 1976. Chapters 1, 2, 8, 9, 10, 12, 13, 14, 15, 16, 17, Appendices.
- ✓ New York State Insurance Department. *Examination of Insurance Companies*. Volume 2, Chapters 9 (pp. 461-474 and 494-522), 10 (pp. 557-633). (Available from Casualty Actuarial Society office. Cost to be determined.) \$4.00
- Committee on Annual Statement. "Report on the Annual Statement." *PCAS LII*, 1965. p. 244.
- ✓ American Institute of Certified Public Accountants. *Audits of Fire and Casualty Insurance Companies*. Chapter 9.
- ✓ Balcarek, R. J. "Effect of Loss Reserve Margins in Calendar Year Results." *PCAS LIII*, 1966. p. 1.
- ✓ Salzmann, R. "Schedule P on a Calendar/Accident Year Basis." *PCAS LIV*, 1967. p. 120.
- ✓ Otteson, P. M. "Some Observations Concerning Fire and Casualty Insurance Company Financial Statements." *PCAS LII*, 1965. p. 215.
- ✓ Pruitt, D. M. "Uniform Accounting—A Study of Regulation." *PCAS XXXVI*, 1949. p. 22.
- Insurance Accounting and Statistical Association. *Proceedings*.

<u>Year</u>	<u>Page</u>	<u>Article</u>
✓ 1965	269	Interpretation and Analysis of Insurance Financial Statements.
✓ 1967	695	Analysis of Financial Conditions. (Four Articles).
✓ 1969	630	Thoughts About Annual Statement Reporting.
✓ 1970	687	Managerial Versus Statutory Accounting.

(2) *Expense Analysis*

- 1978 Insurance Expense Exhibit.
- ✓ Strain, R. W. *Property-Liability Insurance Accounting*. 1974 or 1976. Chapter 11.
- ✓ New York State Regulations, Title 11, Parts 105 through 109 (Regulation 30). (Available from CAS Library.)
- ✓ New York State Insurance Department. *Examination of Insurance Companies*. Volume 4, Chapters 2, 3. (Available from CAS office. Included in booklet referenced above.)
- Insurance Accounting and Statistical Association. *Proceedings*.

<u>Year</u>	<u>Page</u>	<u>Article</u>
✓ 1963	273	Review of Uniform Accounting Instructions and Methods Used by Country Mutual in Allocating Expenses.
✓ 1971	475	Allocation of Investment Income to Underwriting.
✓ 1971	614	Investment Income Allocation.

Morison, G. D. "The 1965 Study of Expenses by Size of Risk." *PCAS LIII*, 1966. p. 61.

(3) *Published Financial Information*

The candidate should be familiar with the sources of published insurance statistics in order to know where to obtain such information when the need arises. The following annual publications constitute a representative list of such sources:

Best, A. M., Co., Inc.

Best's Insurance Report—Property/Liability.

Best's Reproductions of Convention Statements—Property/Liability.

Best's Aggregates and Averages—Property/Liability.

Best's Executive Data Service.

Best's Key Rating Guide.

The National Underwriter.

Argus F. C. & S. Chart.

Argus Chart of Health Insurance.

* New York Insurance Department. *Loss and Expense Ratios* (compiled from ~~2.50~~ Insurance Expense Exhibits).

* New York Insurance Department. *Statistical Tables from Annual Statements*.

(b) **PREMIUM, LOSS AND EXPENSE RESERVES**

Those pages and schedules of the Association Form of the 1978 Annual Statement Blank for Fire and Casualty Companies which relate to reserves.

✓ Study Kit of Current Articles (available from the CAS office at the cost of \$4.00)

✓ Strain, R. W. *Property-Liability Insurance Accounting*. 1974 or 1976. Chapters 3, 6, 7.

✓ New York State Insurance Department. *Examination of Insurance Companies*. Volume 3, Chapters 2 (pp. 95-110), 3 (except pp. 175-204). (Available from CAS office. Included in the booklet referenced in Part 7a.) Study Kit

Skurnick, D. "A Survey of Loss Reserving Methods." *PCAS LX*, 1973. p. 16.

Fisher, W. H. and Lange, J. T. "Loss Reserve Testing: A Report Year Approach." *PCAS LX*, 1973. p. 189.

Tarbell, T. F. "Incurred But Not Reported Claim Reserves." *PCAS XX*, 1933. p. 275 or *PCAS LVIII*, 1971. p. 84.

Bornhuetter, R. L. and Ferguson, R. E. "The Actuary and IBNR." *PCAS LIX*, 1972. p. 181.

Simon, L. J. "Distortion in IBNR Factors." *PCAS LVII*, 1970. p. 64.

Balcarek, R. J. "Reserves for Reopened Claims on Workmen's Compensation." *PCAS XLVIII*, 1961. p. 1.

Resony, A. V. "Allocated Loss Expense Reserves." *PCAS LIX*, 1972. p. 141.

Insurance Accounting and Statistical Association. *Proceedings*.

<u>Year</u>	<u>Page</u>	<u>Article</u>
↓ 1974	693	Testing and Evaluating Loss Expense Reserves

Fisher, W. H. and Lester, E. P. "Loss Reserve Testing in a Changing Environment." *PCAS LXII*, 1975. p. 154.

McClenahan, C. L. "A Mathematical Model for Loss Reserve Analysis." *PCAS LXII*, 1975. p. 134. (The candidate will not be held responsible for notation or the development of the formulas in this paper.)

* → n. y. Ins. Dept, Research Bureau
2 World Trade Center, NYC 10048

FELLOWSHIP

PART 8

Prior to commencing study for this Part, the candidate should read the "Recommendations for Study" section, pages 6 and 7, for study suggestions and guidance in obtaining study notes, out-of-printing readings, past examinations, and other information important to sitting for this examination.

(a) INSURANCE LAW: SUPERVISION AND REGULATION

Insurance Supervision and Regulation is predicated on developing law and legal precedent. To better understand the relationship between insurer operations and those authorities empowered to regulate insurance, basic concepts of law and specific concepts of Insurance Law are presented in the readings below. The candidate should concentrate on those concepts of law which relate to the insurance contract, to the conduct of the business of insurance, and to the way insurance is marketed. The *New York Law* statutes cited are representative of state insurance law which has evolved over time. Since the New York law is periodically revised, care should be exercised in reviewing the most recent version of each section.

The topic of rate regulation is covered extensively in the readings for this section, and the candidate should know both the history of, and the various approaches to, rate regulation in use in different jurisdictions. This topic should be reviewed within the context of the basic objectives of regulation: insurer solvency, availability of insurance, and fair treatment of policyholders and claimants.

Important court cases and legislation which provide the foundations for the present system of regulation should be reviewed as well as proposals to modify the present system.

The NAIC, which is the central body of all state regulation, meets regularly to consider current issues of concern. Its proceedings provide adequate discussion of those issues and has provided in many cases model laws for enactment by each affected state.

The candidate is encouraged to review the Proceedings of the NAIC for committee and subcommittee reports which pertain to *Laws, Legislation, and Regulation (B)*, and *Property and Liability (D)*.

(1) Background Law and Insurance

- ✓ Barnes, A. J. *Self Review in Business Law*. 1970.
- ✓ Anderson, R. A. *The Insurer's Tort Law*. 1971.
- ✗ Kulp, C. A. and Hall, J. W. *Casualty Insurance*. 1968. Chapter 23.
- * ✓ New York (State) Laws, Statutes, etc. *New York Insurance Law*. Articles I-V (except IIIa), VII, VIII, X, XIa, XII, XV (except XVa), and XVI.

The candidate is responsible only for the sections of the law as stated. If he/she is studying from publications such as the Consolidated Laws Service, which cite case histories as well as the law itself, the candidate is not responsible for the case histories although they may be helpful to 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.

(2) Supervision and Regulation

- ✓ Hartman, G. R. *Ratemaking for Homeowners Insurance*. 1967. Chapters 4 and 7.
- ✓ Mertz, A. C. *The First Twenty Years*.
 - Carlson, T. O. "Rate Regulation and the Casualty Actuary." *PCAS XXXVIII*, 1951. p. 9 (excluding appendices).
 - ✓ New York (State) Insurance Department. *The Public Interest Now in Property and Liability Insurance Regulation*. (A Report to Governor Nelson A. Rockefeller, January 7, 1969.) pp. 3-25, 149-150.
 - ✓ Bureau of Insurance, Richmond, Virginia. *Competition in the Property and Casualty Insurance Industry*. January, 1978.

* Can be ordered from Matthew Bender, 235 E. 45 St, N.Y.C. 10017

- ✓ *The Pricing and Marketing of Insurance*—A Report of the Department of Justice to the Task Group on Antitrust Immunities—January 1977. pp. iii-xii. (Available from CAS office at the cost of \$2.00.)
- ✓ *Monitoring Competition—A Means of Regulating the Property and Liability Insurance Business*—National Association of Insurance Commissioners, May 1974. Summary—pp. 671-696 (also published as a supplement to 1974 NAIC Proceedings).
- ✓ Kimball, S. L. and Denenberg, H. S. Eds. *Insurance, Government and Social Policy*. 1969. Chapters 1-4, 8-10, 18.

National Association of Insurance Commissioners (NAIC) *Proceedings* for background information and a general understanding of the operation of the NAIC and the Guide to Use of the Proceeding, the Constitution sections along with the NAIC Organization Chart should be reviewed. The 1976, 1977 and 1978 Volumes of the *Proceedings* should be reviewed for all discussions and committee reports relating to topics covered in section 8 (a), as found in reports of the following Committees and their subcommittees.

Laws, Legislation and Regulation (B)

Property and Liability (D)

- ✓ Post-Assessment Property and Liability Insurance Guaranty Fund—NAIC Model Act—(available from CAS office at the cost of \$2.00).

(b) STATUTORY INSURANCE

This section of this examination part involves a study of insurance coverages mandated by statute. In reviewing the recommended readings the candidate should be aware of the modifications of the tort law system with the introduction of various "First Party" Compensation systems. In addition the candidate should be aware of the relationship of Financial Responsibility laws and the presence of Assigned Risk Plans or other mechanisms for involuntary markets.

Finally, social insurance plans are presented. Since Social Security and related programs (OASDHI) affect almost everyone, special attention should be paid to the underlying concepts of benefits, funding, applicability and administration. While the candidate should be prepared to discuss the development of these concepts over time, it is not necessary to memorize the details of each legislative revision or benefit calculation.

The candidate should expect questions requiring knowledge of the scope of current coverage (including recent legislative changes), and should be prepared to define those terms used in connection with social insurance programs. The candidate should be familiar with current issues as presented in the Myers text and in the trade press.

Disability insurance is also classed as social insurance and, therefore, should be approached by the candidate in a manner similar to the Social Security Programs.

(1) *Statutory Automobile Insurance*

- ✓ Kulp, C. A. and Hall, J. W. *Casualty Insurance*. 1968. Chapters 11 (pp. 372-386 and 411-478), 12 and 13.
- ✓ Department of Transportation. *Motor Vehicle Crash Losses and Their Compensation in the United States*. March 1971.
- ✓ Aponte, J. and Denenberg, H. S. "The Automobile Problem in Puerto Rico: Dimensions and Proposed Solution." *The Journal of Risk and Insurance*. 1968.
- American Insurance Association. *Summary of Selected State Laws and Regulations Affecting Automobile Insurance*. January, 1978 Edition.
 - a. No-Fault Benefits (pp. 2-10)
 - b. Add-On Benefits (pp. 12-16)
 - c. Compulsory Liability, Financial Responsibility, and Uninsured Motorist Laws (pp. 44-60)
 - d. Residual Market Plans (p. 65)
- ✓ Department of Transportation, *A Study of Assigned Risk Plans*. August, 1970.

(2) *Social Insurance and Allied Programs*

- ✓ Myers, R. J. *Social Security*. 1975. Chapters 1-11, 13 and 15. (Including appendices referred to in these chapters.)
- ✓ Robertson, A. Haeworth. *Review of Myers' Social Security* (available from the CAS office at no charge).
- ✓ Robertson, A. Haeworth. *The Outlook for Social Security 1977-2051* (available from CAS office at no charge).
- ✓ *History of the Provisions of the Old-Age, Survivors, Disability and Health Insurance Act 1935-1975*. HEW Publication 76-11515.
- ✓ New York (State) Department of Labor. *Studies in Disability Insurance*. (Special Bulletin #224) Out of print. (Available from CAS Library.)
- ✓ Schwartz, M. J. "New York Statutory Disability Benefits Law, Coverage, Rates and Rating Plans." *PCAS XXXVII*, 1950. p. 57.

PART 9

Prior to commencing study for this Part, the candidate should read the "Recommendations for Study" section, pages 6 and 7, for study suggestions and guidance in obtaining study notes, out-of-printing readings, past examinations, and other information important to sitting for this examination.

(a) **ADVANCED RATEMAKING**

Candidates for this part are expected to have acquired considerable technical knowledge and practical experience in insurance ratemaking. In addition, they should keep in touch with current developments and problems in ratemaking. The examination will assume a working knowledge of basic ratemaking and will deal with advanced problems such as, those covered in the papers listed below. The examination will not necessarily be limited to the excerpts expressed in the listed papers. 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 which a fully qualified actuary working in ratemaking should be able to solve.

All the papers in this section should be read for illustrations of basic principles and theories, as well as any insights into advanced ratemaking problems and their solutions. In none of the papers is the derivation of formulas or equations to be stressed, but some applications of those techniques may be required. Some papers are included primarily for their historical significance, in order to gain perspective on the state of the art and the constancy of ratemaking principles.

- ✓ "Study Kit on Advanced Ratemaking" (Available from CAS office at the cost of \$4.00).
- ✓ Kimball, S. L. and Denenberg, H. S., Eds. *Insurance, Government, and Social Policy*. 1969. Chapter 11.
- ✓ Bailey, R. A. "Insurance Rates with Minimum Bias." *PCAS L*, 1963. p. 4.
- ✓ Lange, J. T. "Implications of Sampling Theory for Package Policy Ratemaking." *PCAS LIII*, 1966. p. 285.
- ✓ Longley-Cook, L. H. "Underwriting Profit in Fire Bureau Rates." *PCAS LIII*, 1966. p. 305.
- ✓ Lange, J. T. "Application of a Mathematical Concept of Risk to Property-Liability Insurance Ratemaking." *The Journal of Risk and Insurance*. Volume XXXVI, No. 4. 1969.
- ✓ Finger, R. J. "A Note on Basic Limits Trend Factors." *PCAS LXIII*, 1976.
- ✓ Miccolis, R. S. "On the Theory of Increased Limits and Excess of Loss Pricing." *PCAS LXIV*, 1977.
- ✓ Bickerstaff, D. R. "Automobile Collision Deductibles and Repair Cost Groups: The Lognormal Model." *PCAS LIX*, 1972. p. 68.

- Whitman, A. F. and Williams, C. A. "Environmental Hazards and Rating." *The Journal of Risk and Insurance*. Vol. XXXVII, No. 3 September 1970. pp. 419-436.
- Dropkin, L. B. "Some Considerations on Automobile Rating Systems Utilizing Individual Driving Records." *PCAS XLVI*, 1959. p. 165.
- Bailey, R. A. and Simon, L. J. "An Actuarial Note on the Credibility of Experience of a Single Private Passenger Car." *PCAS XLVI*, 1959. p. 159.
- Mayerson, A. L. "A Bayesian View of Credibility." *PCAS LI*, 1964. p. 85.
- Mayerson, A. L., Jones, D. A., Bowers, N. L. (Jr.) "The Credibility of the Pure Premium." *PCAS LV*, 1968. p. 175.
- Hewitt, C. C. "Credibility for Severity." *PCAS LVII*, 1970. p. 148.
- Backman, J. *Surety Rate Making*. 1948. Chapters 8, 12, 13.
- Roth, R. J. "The Rating of Crop-Hail Insurance." *PCAS XLVII*, 1960. p. 108.
- Wade, R. C. "Expense Analysis in Ratemaking and Pricing." *PCAS LX*, 1973. p. 1.

(b) INDIVIDUAL RISK RATING

One of the most 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 provides detail readings on individual experience risk rating so that the candidate will be prepared to design and manage an individual risk rating system.

Individual risk rating consists of two principal sections:

- (1) Prospective rating which is more commonly known as Experience rating.
- (2) Retrospective rating.

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

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

The candidate is 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. Finally, the candidate should keep abreast of current developments and problems as they apply to individual risk rating.

Candidates unfamiliar with the general principles underlying individual risk rating plans should review Michelbacher and Roos, Chapter 3, and Kulp and Hall, Chapter 22, before studying the required readings for this part. The candidate may gain a better understanding of the application of prospective and retrospective rating plans from John R. Stafford's books, "Workers Compensation Experience Rating" and "Retrospective Rating" but will not be held responsible for their contents. It is realized that parts of some technical articles cited in the recommended reading for this part are not current. However, the candidate should study all articles for their explanation of theory.

(1) General

- Snader, R. H. "Fundamentals of Individual Risk Rating and Related Topics." Parts I and II of Study Note. (Available from CAS office at a cost of \$1.00.)

(2) Experience Rating

The candidate should study the following rating plans and the forms used in the application thereof:

National Council on Compensation Insurance:
Experience Rating Plan

Insurance Services Office, Experience and Schedule Rating Plans applicable to:
General Liability

Surety Association of America:

Experience Rating Plan—Financial Institutions.

- Dorweiler, P. "A Survey of Risk Credibility in Experience Rating." *PCAS XXI*, 1934. p. 1 or *PCAS LVIII*, 1971. p. 90.
- Perryman, F. S. "Experience Rating Plan Credibilities." *PCAS XXIV*, 1937. p. 60 or *PCAS LVIII*, 1971. p. 143.
- Uthoff, D. R. "The Compensation Experience Rating Plan—A Current Review." *PCAS XLVI*, 1959. p. 285.

(3) *Retrospective Rating*

The candidate should study the following retrospective rating plans and the forms used in the application thereof:

National Council on Compensation Insurance:

Retrospective Rating Plans—Plans A, B, C and J.

Retrospective Rating Plan D.

Retrospective Rating Plan D—Rating Supplement for Workmen's Compensation.

Insurance Services Office:

Retrospective Rating Plan D—Rating Supplement for Liability, Burglary and Glass Lines.

Retrospective Rating Plan D—Rating Supplement for Automobile Physical Damage.

- Dorweiler, P. "On Graduating Excess Pure Premium Ratios." *PCAS XXVIII*, 1941. p. 132.
- Carlson, T. O. "An Actuarial Analysis of Retrospective Rating." *PCAS XXVIII*, 1941. p. 283.
- Valerius, N. M. "Risk Distributions Underlying Insurance Charges in the Retrospective Rating Plan." *PCAS XXIX*, 1942. p. 96.
- Harwayne, F. "Accident Limitation for Retrospective Rating." *PCAS LXIII*, 1976. p. 1.
- Foster, R. B. "The Boiler and Machinery Adjustment Rating Plan." *PCAS XLI*, 1954. p. 135.
- Skurnick, D. "The California Table L." *PCAS LXI*, 1974. p. 117.
- Hewitt, C. C. "Loss Ratio Distribution—A Model." *PCAS LIV*, 1967. p. 70.

(4) *Miscellaneous Rating*

The candidate should study the following rating plans and the forms used in the application thereof:

Insurance Services Office:

Composite Rating Plan (Automobile, General Liability, Burglary, Glass.)

Insurance Services Office:

- ✓ *Commercial Fire Rating Schedule*. Copyright 1975. (Summary available from CAS office at the cost of \$2.00 per copy.)

PART 10

Prior to commencing study for this Part, the candidate should read the "Recommendations for Study" section, pages 6 and 7, for study suggestions and guidance in obtaining study notes, out-of-printing readings, past examinations, and other information important to sitting for this examination.

Part 10 represents the final step in the examination process and is designed to test both the breadth and depth of the candidate's understanding of the insurance process. The candidate is expected to have acquired considerable technical knowledge and practical experience during preparation for the previous examinations. The candidate's ability to apply this knowledge and experience may be tested through questions dealing with problems for which there may be no generally recognized solutions.

The required reading material for this examination is divided into four sections, each of which build on information covered in previous examinations. Questions may be asked which require use of material mastered in preparation for these previous examinations.

(a) OPERATIONS OF INSURANCE COMPANIES

This section explores the various relationships that exist between underwriting results, investment income, and taxes that arise out of the underwriting process and total operating income. The candidate is also expected to develop an appreciation of the varying standards employed in measuring overall operations from the perspective of the stockholder, the manager, the regulator and the policyholder. The candidate should be prepared to compare and evaluate the procedures discussed and the arguments advanced in the readings. The answers provided by the candidate will be graded based on their applicability to the specific problem presented and the professional competence evidenced by the answer.

Herron, S. D., Jr. "Insurance Company Investments." *PCAS LII*, 1965. p. 238.

✓ National Association of Insurance Commissioners. *Measurement of Profitability and Treatment of Investment Income in Property and Liability Insurance*. June 1970. 1970 Proceedings of NAIC, Vol. IIA. pp. 738-951.

Balcarek, R. J. "The Capital Investment Market and the Insurance Industry." *PCAS LV*, 1968. p. 186.

✓ Kimball, S. L. and Denenberg, H. S., Eds. *Insurance, Government and Social Policy*. 1969. Chapter 6.

✓ Strain, R. W. *Property-Liability Insurance Accounting*. 1974 or 1976. Chapter 5.

Beckman, R. W. "Federal Income Taxes." *PCAS LVIII*, 1971.

✓ Ferrari, J. R. "The Relationship of Underwriting, Investments, Leverage, and Exposure to Total Return on Owners' Equity." *PCAS LV*, 1968. p. 295.

✓ Hedges, B. A. "Insurance Rates and Investment Earnings Considered Together." *The Journal of Risk and Insurance*. Volume XXXVI, No. 4 (September, 1969). p. 455.

✓ Ferrari, J. R. "A Theoretical Portfolio Selection Approach for Insuring Property and Liability Lines." *PCAS LIV*, 1967. p. 33.

✓ Bailey, R. A. "Underwriting Profit from Investments." *PCAS LIV*, 1967. p. 1.

National Association of Insurance Commissioners. *Using the Early Warning System: NAIC Regulatory Tests for Property and Liability Insurers*. 1977.

Stone, J. M. "A Theory of Capacity and the Insurance of Catastrophe Risks." *The Journal of Risk and Insurance*. Part I in Vol. XL No. 2 (June, 1973) p. 231 and Part II in Vol. XL No. 3 (September, 1973) p. 339.

✓ Joskow, P. L. "Cartels, Competition and Regulation in the Property-Liability Insurance Industry." *Bell Journal of Economics and Management Science*. (available from the CAS office—at the cost of \$1.00 per copy.)

(b) REINSURANCE AND EXCESS RATING

This section deals with various techniques for risk sharing between an insurer and a reinsurer as well as between an insured and an insurer.

The candidate should have a general knowledge and understanding of:

1. The various types of reinsurance, the advantages and disadvantages of each type, the purpose of each type, and the effects of reinsurance transactions on the company operating results and other financial information, as well as methods employed to analyze costs.

2. Deductible and Excess coverages, and the problems inherent in pricing these coverages for various lines.

- ✓ Snader, R. H. "Fundamentals of Individual Risk Rating and Related Topics." Part III of study note (available from CAS office as noted in Part 9(b) for cost of \$1.00).
- ✓ Kulp, C. A. and Hall, J. W. *Casualty Insurance*. 1968. Chapter 17.
- ✓ Munich Reinsurance Company, *Reinsurance and Reassurance*. Vol. I-IV.
- ✓ *Casualty Contingencies (exposure draft)*. Chapter 13 "Deductibles, Excess Covers, and Coinsurance Clauses" and Chapter 14 "Non-Proportional Reinsurance, Retentions and Surplus" (available from the CAS office—at a cost of \$2.00 per copy.)
- ✓ Cahill, J. M. "Deductible and Excess Coverages, Liability and Property Damage Lines Other Than Automobile." *PCAS XXIII*, 1936. p. 18 or *PCAS LVIII*, 1971. p. 115.
- ✓ Cahill, J. M. "Excess Coverage (per accident basis) for Self-Insurers: Workmen's Compensation-New York." *PCAS XXVII*, 1940. p. 77.
- ✓ Salzman, R. "Rating by Layer of Insurance." *PCAS L*, 1963. p. 15.
- ✓ Ferguson, R. E. "Nonproportional Reinsurance and The Index Clause." *PCAS LXI*, 1974. p. 141.

(c) FORECASTING

An actuary may be expected to develop both short and long range forecasts, and to play a key role in the corporate planning process of an insurance company. This section was designed to familiarize the candidate with various techniques employed in forecasting and planning. The readings are of a general nature and the candidate should be prepared for questions which will test the candidate's ability to apply these principles to insurance problems. The first three readings are available from the CAS office.

- ✓ Chambers, J. C., Mullick, S. K. and Smith, D. D. "How to Choose the Right Forecasting Technique." *Harvard Business Review* July-August 1971. p. 45.
- ✓ Parker, G. G. C. and Segura, E. L. "How to Get a Better Forecast." *Harvard Business Review* March-April 1971. p. 99. FREE
- ✓ McLagan, D. L. "A Non-Econometrician's Guide to Econometrics." *Business Economics* Vol. VIII, No. 3, May 1973, p. 38. FREE
- ✓ McGuinness, J. S. "Elements of Time—Series Analysis in Liability and Property Insurance Ratemaking." *PCAS LV*, 1968. p. 202.
- ✓ Lommele, J. A. and Sturgis, R. W. "An Econometric Model of Workmen's Compensation." *PCAS LXI*, 1974. p. 170.

(d) CURRENT EVENTS AND ISSUES

This section deals with topics of current interest in the industry with which the candidate should be familiar. It is the responsibility of the candidate to be aware of significant current events and issues.

In preparing for this subject, the candidate is expected to recognize major issues while reading articles in the general press and in trade journals. It is essential that the candidate do his own study and research by obtaining and reading whatever industry papers are available and by discussing these articles with people in the industry. The candidate must be able to identify the issues involved and to discuss the relative merit of any solutions that might be proposed for problem areas addressed. The emphasis should be on items which are of major importance to the industry.

The candidate should pay particular attention to all pertinent papers and reviews in the Proceedings of the Casualty Actuarial Society for 1976 and 1977. The candidate should also review the 1977 and 1978 volumes of the Proceedings of the National Association of Insurance Commissioners for relevant material.

INDEX TO READINGS

- Readings are available through the library of the Casualty Actuarial Society. However, the following information is furnished for those who wish to purchase the references.
- Ackoff, R. L. and Rivett, P. *A Managers Guide to Operations Research*. (1963). John Wiley and Sons, Inc., 605 Third Avenue, New York, New York 10016.
- Alliance of American Insurers, 20 North Wacker Drive, Chicago, Illinois 60606.
- American Institute of Certified Public Accountants. *Audits of Fire and Casualty Insurance Companies*. Chapter 9. American Institute of Certified Public Accountants, 666 Fifth Avenue, New York, New York 10019.
- American Institute for Property and Liability Underwriters. *Readings in Underwriting*. American Institute for Property and Liability Underwriters, Providence and Sugartown Roads, Malvern, Pennsylvania 19355.
- American Insurance Association. *Summary of Selected State Laws and Regulations Relating to Automobile Insurance*. (1978 Edition). American Insurance Association, 85 John Street, New York, New York 10038.
- Anderson, R. A. *The Insurer's Tort Law*. (1971). The Littoral Development Company, 252 South Van Pelt Street, Philadelphia, Pennsylvania 19103.
- Backman, J. *Surety Rate-Making*. (1948). Surety Association of America, 110 William Street, New York, New York 10038.
- Barnes, A. J. *Self Review in Business Law*. (1970). Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, Illinois 60430.
- Bartleson, E. L. *Health Insurance Provided Through Individual Policies*. (1968). The Society of Actuaries, 208 South LaSalle Street, Chicago, Illinois 60604.
- Best, A. M., Company, Inc., Ambest Road, Oldwick, New Jersey 08858.
- Bickelhaupt, D. L. *General Insurance*. (1974). Richard D. Irwin, 1818 Ridge Road, Homewood, Illinois 60430.
- Bradley, Gerald L. *A Primer of Linear Algebra*. (1975). Prentice-Hall, Inc., Englewood Cliffs, New Jersey 07632.
- Burch, J. G. (Jr.) and Strater, F. R. (Jr.) *Information Systems: Theory and Practice*. John Wiley and Sons, Inc., 605 Third Avenue, New York, New York 10016.
- Bureau of Insurance, Richmond, Virginia. *Competition in the Property and Casualty Insurance Industry*. January 1978. Bureau of Insurance, State Corporation Commission, Richmond, Virginia 23219.
- CPCU Annals, Penn State Building, Media, Pennsylvania 19063.
- Casualty Actuarial Society, One Penn Plaza, 250 West 34th Street, New York, New York 10001.
- Chambers, J. C., Mullick, S. K. and Smith, D. D. "How to Choose the Right Forecasting Technique." *Harvard Business Review* July-August 1971. p. 45.
- Curtis, Charles W. *Linear Algebra, an Introductory Approach*. (Third Edition) (1974). Allyn & Bacon, Inc., College Division, Rockleigh, New Jersey 07647.
- De Groot, Morris H. *Probability and Statistics*. (1975). Addison-Wesley Publishing Co., Inc. Jacob Way, Reading, Massachusetts 01867.
- Department of Health Education and Welfare, (H.E.W.) *History of the Provisions of Old-Age, Survivors, Disability, and Health Insurance 1935-1975*. Social Security Administration, Office of the Actuary. DHEW Publication No. (SSA) 76-11515. Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.
- Department of Transportation. *Motor Vehicle Crash Losses and Their Compensation in the United States*. March, 1971. GPO-1971-0-420-342. Superintendent of Documents, Government Printing Office, Washington, D.C. 20402.

~~Temporary address~~ International office mail Plaza Durham NC 27701

Eilers, R. D. and Crowe, R. M., Eds. *Group Insurance Handbook*. (1965). Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, Illinois 60430.

Hartman, G. R. *Ratemaking for Homeowners Insurance*. (1967). Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, Illinois 60430.

Harvard Business Review, Reprint Manager, Boston, Massachusetts 02163.

Head, G. L. *Insurance to Value*. (1971). Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, Illinois 60430.

Hoel, P. G., Port, S. C., and Stone, C. J. *Introduction to Probability Theory and Introduction to Statistical Theory*. 1971 Text Edition. Houghton Mifflin Co., 2 Park Street, Boston, Massachusetts 02107 or 551 Fifth Avenue, New York, New York 10017.

Hogg, R. V. and Craig, A. T. *Introduction to Mathematical Statistics*. (Fourth Edition) 1978 Text Edition. Macmillan Publishing Company, Inc., 866 Third Avenue, New York, New York 10022.

Insurance Accounting and Statistical Association, 406 West 34th Street, Kansas City, Missouri 64111.

Insurance Services Office, 160 Water Street, New York, New York 10038.

Johnson, R. E., and Kiokemeister, F. L. *Calculus with Analytic Geometry*. (Fourth Edition). Allyn and Bacon, Inc., Rockleigh, New Jersey 07647.

Jordan, C. W. *Life Contingencies*. (Second Edition) (1967). Society of Actuaries, 208 South LaSalle Street, Chicago, Illinois 60604.

Journal of Risk and Insurance (The), The American Risk and Insurance Association, Inc., 112 E. Washington Street, Bloomington, Illinois 61701.

Kellison, S. G. *Fundamentals of Numerical Analysis*. (1975). Text Edition. Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, Illinois 60430.

Kellison, S. G. *The Theory of Interest*. (1970 Edition or 1975 reprint of 1970 Edition). Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, Illinois 60430.

Kimball, S. L. and Denenberg, H. S., Eds. *Insurance, Government and Social Policy*. (1969). Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, Illinois 60430.

Kulp, C. A. and Hall, J. W. *Casualty Insurance*. (Fourth Edition) (1968). The Ronald Press Co., 79 Madison Avenue, New York, New York 10016. *Div. of John Wiley & Sons*

Lang, Serge. *Linear Algebra*. (Second Edition). (1971). Addison-Wesley Publishing Co., Inc., Jacob Way, Reading, Massachusetts 01867. *605 3rd Ave*

Lipschutz, Seymour. *Linear Algebra*. (Schaum's Outline Series) McGraw-Hill Book Company, Manchester Road, Manchester, Missouri 63011.

Longley-Cook, L. H. *An Introduction to Credibility Theory*. (1962). Casualty Actuarial Society.

MacIntyre, D. M. *Voluntary Health Insurance and Rate-Making*. (1962). Cornell University Press, 124 Roberts Place, Ithaca, New York 14858.

McLagan, D. L. "A Non-Econometrician's Guide to Econometrics." *Business Economics*, Vol. VIII, No. 3, May 1973. p. 38.

Mertz, A. C. *The First Twenty Years*. National Association of Independent Insurers. (Available in many property-liability insurance companies and from Casualty Actuarial Society Library. Do not write to National Association of Independent Insurers.)

Michelbacher, G. F. and Roos, N. R. *Multiple-Line Insurers: Their Nature and Operation*. (1970). McGraw-Hill Book Company, Manchester Road, Manchester, Missouri 63011.

Mood, A. M., Graybill, F. A. and Bees, D. C. *Introduction to The Theory of Statistics*. (Third Edition) 1974 Text Edition. McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, New York 10036.

Munich Reinsurance Company. *Reinsurance and Reassurance*. (Available in many property-liability insurance companies and from Casualty Actuarial Society Library. Do not write to Munich Reinsurance Company.)

- Myers, R. J. *Social Security*. (1975). Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, Illinois 60430.
- National Association of Insurance Commissioners, ~~660 E. Mason Street~~, Milwaukee, ^{633 W. Wisconsin Ave} ~~Wisconsin 53202~~ ^{State} ~~53203~~ ^{101.}
- National Council on Compensation Insurance, 200 East 42nd Street, New York, New York 10017.
- National Underwriter Company (The), 420 E. Fourth Street, Cincinnati, Ohio 45202.
- New York (State) Department of Labor. Division of Research and Statistics. *Studies in Disability Insurance*. (1949). (Special Bulletin No. 224). The New York State Department of Labor, 80 Centre Street, New York, New York 10013. (Out-of-print. Available from C.A.S. Library.)
- New York (State) Insurance Department, 324 State Street, Albany, New York 12210.
Examination of Insurance Companies. (Available at C.A.S. Office.)
Loss and Expense Ratios.
The Public Interest Now in Property and Liability Insurance Regulation. (A report to Governor Nelson A. Rockefeller, January 7, 1969.)
Statistical Tables from Annual Statements.
- New York (State) Laws, Statutes, etc. *New York Insurance Law*. (This can be obtained from the West Publishing Company, St. Paul, Minnesota.)
- Parker, G. G. C. and Segura, E. L. "How to Get a Better Forecast." *Harvard Business Review* March-April 1971. p. 99.
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- Purcell, E. J. *Calculus with Analytic Geometry*. (Second Edition) 1972 Text Edition. Prentice-Hall, Inc., Englewood Cliffs, New Jersey 07632.
- Raiffa, H. *Decision Analysis—Introductory Lectures on Choices Under Uncertainty*. Addison-Wesley Publishing Company, Inc., Reading, Massachusetts 01867.
- Samuelson, P. A. *Economics*. (10th Edition). (1976). McGraw-Hill Book Company, Manchester Road, Manchester, Missouri 63011.
- Spiegel, M. R. *Theory and Problems of Statistics*. (Schaum's Outline Series). McGraw-Hill Book Company, Manchester Road, Manchester, Missouri 63011.
- Stafford, John R. *Workers Compensation Experience Rating and Retrospective Rating*. J & M Publication, P. O. Box 338, Palatine, Illinois 60067.
- Stanton, William J. *Fundamentals of Marketing*. (Fifth Edition.) (1978). McGraw-Hill Book Company, Manchester Road, Manchester, Missouri 63011.
- Strain, R. W. *Property-Liability Insurance Accounting*. (1974 or 1976). The Merritt Company, Insurers Press Products, Box 1265, Santa Monica, California 90406.
- Surety Association of America, 125 Maiden Lane, New York, New York 10038.
- Swift, John S. Company, 70 Bethume Street, New York, New York 10014. 1978 Annual Statement Blanks and 1978 Insurance Expense Exhibit.
- Tanur, Mosteller, Kruskal, Link, Pieters, and Rising. *Statistics: A Guide to the Unknown*. (1972). Holden-Day, 500 Sansome Street, San Francisco, California 94111.
- Thomas, G. B. (Jr.) *Calculus and Analytic Geometry*. (Fourth Edition). 1968 or 1972 Text Edition, Two Parts. Addison-Wesley Publishing Company, Inc., Reading, Massachusetts 01867.
- Wagner, H. M. *Principles of Operations Research*. (Second Edition). (1975). Prentice-Hall, Inc., Englewood Cliffs, New Jersey 07632.

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