CASUALTY ACTUARIAL SOCIETY

ORGANIZED 1914

RECOMMENDATIONS FOR STUDY

(1977 Syllabus)

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RULES REGARDING EXAMINATIONS FOR ADMISSION

SYLLABUS OF EXAMINATIONS

RECOMMENDATIONS FOR STUDY

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OFFICE OF THE SOCIETY

200 East 42nd Street—New York, New York 10017

Twenty-second Edition, 1977

RULES REGARDING EXAMINATIONS FOR ADMISSION
(Effective with May 1977 Examinations)

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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 candidate who wishes to take one or more of Parts 1, 2 and 3 must make application on the Casualty Actuarial Society's application form, which may be obtained from the Secretary.

A candidate who has previously submitted his application on the Society's application form, and who wishes to take one or more examinations other than Parts 1, 2 and 3, need not again make use of the Society's application form, but the candidate may simply write to the Secretary, stating the part or parts for which he is applying.

Each application must be accompanied by the appropriate examination fee, in check, draft, or money order payable to the Casualty Actuarial Society.

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) examinations one through seven 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

The examination fee schedule at time of publication is as follows:

Parts 1-3	$15.00 for each Part
Parts 4(a), 4(b)	10.00 for each Part
Parts 4-10	20.00 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 before April 1 for the May examinations, or before October 1 for November examinations. Late registrations will be accepted through April 15 and October 15 if accompanied by a $50.00 late registration fee for each Part.

6. Credit for Examination Parts Under Former Syllabus

A candidate who has passed, or been credited with, one or more of the examinations under the 1974 Syllabus will receive credit for the corresponding examinations of the 1977 Syllabus in accordance with the following table:

Parts Passed or Credited Under 1974 Syllabus	Parts Credited Under 1977 Syllabus
1	1
2	2
3	3 and 4(a)
4	4(b) and 5
5	4(b) and 6
6	8
7	7
8	9(b)
9	9(a) and 10

On application to the Secretary, partial Part 4 examinations will be given in May 1977 to those candidates requiring them in accordance with the above credits. *Beginning with the November 1977 examinations, no candidate will be permitted to write only a portion of any examination and all partial credits will expire.*

7. 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 of the Society of Actuaries, in accordance with the following:

Casualty Actuarial Society	Society of Actuaries
Part 1	Part 1, General Mathematics, passed prior to 1963 (before joint administration)
Part 2	Part 2, Probability and Statistics, passed prior to 1966 (before joint administration)
Part 3	Part 3, Numerical Analysis (or Finite Differences) and Theory of Interest (or Compound Interest)
Part 4(a)	Part 4, Life Contingencies

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 I 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 less difficult Society examination.

The 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.

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 200 East 42nd Street, New York, New York 10017.

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
200 East 42nd Street
New York, New York 10017

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
200 East 42nd Street
New York, New York 10017

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.

SYLLABUS OF EXAMINATIONS

Associateship Examinations

Part	Time Allowed	Subjects
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	3 hours	Principles of Ratemaking and Insurance Statistics
7	3 hours	Insurance Accounting and Expense Analysis Premium, Loss, and Expense Reserves

Fellowship Examinations

Part	Time Allowed	Subjects
8	3 hours	Insurance Law; Supervision and Regulation Statutory Insurances
9	4 hours	Advanced Ratemaking Individual Risk Rating
10	3 hours	Operations of Insurance Companies, Reinsurance, Topics of Current Interest

Jointly administered with the Society of Actuaries

RECOMMENDATIONS FOR STUDY

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 one'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 each part of the Fellowship Examinations, 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 booklet.

A more detailed reference of the texts cited in the syllabus 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 student with the respective subjects and should not be interpreted as representing views endorsed by the Casualty Actuarial Society. Copies of out-of-print readings may be obtained by writing the CAS Library.

A study note has been prepared to assist the student in connection with the examinations for Parts 9 and 10 and can be obtained from the Secretary's office at a cost of $1.00 per copy. From time to time additional study notes will become available and the student should make inquiry of the Secretary of the Society. Also available without charge is a note entitled "Hints on Study and Exam Techniques."

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

Part 6 ....$3.00
Part 8 .... 3.00
Part 9(b) 5.00
Part 7, 9(a) 3.00

Copies of examinations for recent years and sample examination questions may be obtained from the Secretary.

PART 1

GENERAL MATHEMATICS

Jointly administered by 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; determinants and elementary matrix algebra; 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.

Students who have not had mathematics courses covering these topics may be helped by any one of the four texts listed below. These may be considered representative of the many texts used in American colleges which adequately cover the material upon which the candidate may be examined.

Thomas, Jr., G. B., *Calculus and Analytic Geometry* (Fourth Edition). 1968.

Johnson, R. E. and Kiokemeister, F. L., *Calculus and Analytic Geometry* (Fourth Edition). 1969.

Protter, M. H. and Morrey, Jr., C. B., *College Calculus with Analytic Geometry* (Second Edition). 1970.

Purcell, E. J., *Calculus with Analytic Geometry*. 1972.

PART 2

PROBABILITY AND STATISTICS

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, conditonal 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 distributions, to confidence intervals and to tests for means and variances; regression and correlation; random sampling and randomization techniques; interpretation of experimental results; Bayesian statistics.

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.

Hoel, P. G., *Introduction to Mathematical Statistics* (Fourth Edition). 1971.

Hogg, R. V. and Craig, A. T., *Introduction to Mathematical Statistics* (Third Edition). 1970.

Hoel, P. G., Port, S. C., and Stone, C. J., *Introduction to Probability Theory and Introduction to Statistical Theory*. 1971.

Mood, A. M., Graybill, F. A., and Bees, D. C., *Introduction to the Theory of Statistics* (Third Edition). 1974.

Students 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.

An additional reference, for students 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 students 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* 1972. (Holden-Day), also available in paperback form.

It will be assumed that the student 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

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. The examination is based solely on the material in Kellison's 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*, 1975. Chapters 1-4, Chapters 5 (Sections 1-5 and 8-10). Chapter 6 (Sections 1-5). Chapter 7 (Sections 1-5). Chapter 8 (Sections 1-4 and 6-8). Chapter 9 (Sections 1-3). Chapters 11 and 12. Chapter 13 (Sections 1-8).

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 student will also be expected to be able to apply elementary

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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 student to the Secretary at the Society's office.

Kellison, S. G., *The Theory of Interest.* 1970 or 1975 reprint of 1970 Edition.

In addition to a thorough knowledge of the texts, the student is expected to have worked the problems at the end of each chapter.

For many students, 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 students will find it helpful to maintain contact with other Part 3 students and to take advantage of opportunities to discuss with others questions that are considered difficult. Students 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 student'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 students applying for the examination by writing the Secretary at the 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, students 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 "Recommendation for Study" section, page 6, should be read 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) LIFE CONTINGENCIES

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

Davis, G. B. *Introduction to Electronic Computers.* 1971. Chapters 1, 2, 3, 4, 5, 8, 10, 19.

Raiffa, H. *Decision Analysis-Introductory Lectures on Choices Under Uncertainty.* Chapters 1 through 6.

Insurance companies have found that operations research techniques may be applied in solving insurance problems. Occasionally, an actuary may be assigned a specific work problem which would be most expeditiously solved by operations research methods. Frequently, there will be more than one way of solving a complex actuarial problem and a familiarity with operations research techniques can help the actuary select the one best suited to the problem.

It is not expected that this examination will make the candidate an operations research expert. Rather, it is designed to *introduce* the student to operations research, much in the

way a one-semester, first course in the subject would. This is accomplished by selecting several important operations research techniques and requiring that the candidate learn them in detail, including an ability to solve numerical problems. Other operations research techniques are simply surveyed and the candidate is required only to have a general familiarity, knowing when the technique should be applied.

The following sections of the Wagner text are those for which the candidate is expected to be able to recognize applications of the technique, set up problems and work numerical problems. The test will include both short-answer objective questions and longer problems on this subject matter.

Wagner, H. M. *Principles of Operations Research.* 1975.

Chapters 2, 3 (pp. 73-81), 4 (pp. 91-106), 5 (pp. 127-145), 8 (pp. 263-270), 20 (pp. 851-884).

or as listed in 1976 Syllabus

Chapters 2, 3 (pp. 73-81), 4 (pp. 91-106), 5 (pp. 127-145), 8 (pp. 263-270), 20 (pp. 851-884) in the second edition (1975).

In the remaining sections, listed below, the candidate will *not* be required to reproduce mathematical formulas, to set up problems or to work numerical examples. However, he will be expected to recognize the type of problem to which these techniques might apply. For this section, the test will consist solely of short-answer questions.

Wagner, H. M. *Principles of Operations Research.* 1975.

Chapters 1, 11 (pp. 383-396), 16 (pp. 651-677), 21 (pp. 903-915), and 22.

The following paper is given as an example of an application of an operations research approach to an insurance problem. The candidate will not be asked to reproduce formulas or work examples. He will be expected to know which operations research techniques were employed and how they were used for the particular insurance situation described in the paper. Only short-answer question(s) will be asked on this paper.

Cozzolino and Freifelder, "Underwriting Individual Drivers: A Sequential Approach."

PCAS LX, 1973. p. 63. *also (article)*

PART 5

Prior to commencing study for this Part, the "Recommendation for Study" section, page 6, should be read 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) 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.* 1973 or 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 candidate should be familiar with 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.

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 is use. The candidate will be held responsible for knowledge of the following policy forms (not the associated endorsements): Family Auto,

Homeowners, Workers' Compensation. Copies of current insurance contracts may be obtained from a carrier or references may be made to 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.

American Mutual Insurance Alliance.

Study Kit of Policies, Forms and Endorsements-Casualty, Fire, Marine and Life. Current edition.

or

Insurance Information Institute.

Advanced Book of Sample Insurance Policies for Property and Liability Coverages. Current edition.

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

Insurance Services Office.

Private Passenger Automobile Manual. General Rules pp. 1-27. *Homeowners Policy Manual of Rules and Rates*. General Rules pp. 1-11. *Owners, Landlords and Tenants Liability Manual*. General Rules pp. 1-9, 45-66

National Council on Compensation Insurance.

Basic Manual of Rules, Classifications and Rates for Workmen's Compensation and Employers' Liability Insurance. General Rules pp. R1-R26.

(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)

(3) *Product Design and Marketing*

The chapter and page references set forth in the following paragraphs are to Stanton, William J., *Fundamentals of Marketing-Fourth Edition*, 1975.

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 reference does not deal directly with insurance, the student may omit the questions, problems, case histories and appendix. The examination questions will not require that the student 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.

* Student must get on their own.

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

(1) Chapter 24, "Marketing of Services," pages 544-561, 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 191-203, 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 170-189, 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 1-2-3-4-5 policies. In thinking of applications of this chapter to insurance, the student 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 26, "A Marketing Information System and Marketing Information," pages 604-632, has been included primarily so that the student 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.

Students who do not have a background in marketing should review the first seven chapters 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 the first seven chapters.

Since questions will deal with the applicability of certain marketing considerations to insurance products, it is suggested that the student 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 "Recommendation for Study" section, page 6, should be read 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) PRINCIPLES OF RATEMAKING

It is recommended that the student study references in the order listed.

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.

Casualty Contingencies [*exposure draft*]. Chapter 10 "Organization and Analysis of Risk Data," Chapter 11 "Classification Ratemaking" and Chapter 12 "Individual Risk Ratemaking" (available from the CAS office).

Long and Gregg, *Property and Liability Insurance Handbook.* 1965 Chapters 13, 20 (pp. 285-297 only), 28, 56.

Dorweiler, P. "Notes on Exposures and Premium Bases." *PCAS XVI,* 1929. p. 319 or *PCAS LVIII,* 1971. p. 59.

Longley-Cook, L. H. *An Introduction to Credibility Theory.* 1962.

Kallop, R. *"Workers' Compensation Insurance Ratemaking"* (available from the CAS office).

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.

Tarbell, L. L. "Automobile Physical Damage Ratemaking." *PCAS XLVI,* 1959. p. 123.

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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.*

Insurance Services Office. *Recommended Procedure for Statewide Rate Level Analysis— Extended Coverage Insurance, Commercial Property.* December 1972.

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.

"Individual Risk Rating Plans." (a study note available from the CAS office).

(b)   INSURANCE STATISTICS

This section includes reading which covers 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. References are listed in the suggested order for study.

Michelbacher, G. F. and Roos, N. R. *Multiple-Line Insurers: Their Nature and Operation.* 1970. Chapter 11.

Kimball, S. L. and Denenberg, H. S. Eds. *Insurance, Government and Social Policy.* 1969. Chapter 13.

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

Insurance Services Office. *Automobile Statistical Plan.*

Insurance Services Office. *Personal Lines Statistical Plan for Homeowners Policies, Mobil-homes Policies, Comprehensive Dwelling Policies, Dwelling Policies.*

Health Insurance Associaton of America. *Statistical Plan for Individual Accident and Health and Individual and Family Hospital, Surgical, Medical Policies.* 1958.

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.

  Best's Insurance Reports—Property/Liability.

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

  Best's Aggregates and Averages—Property/Liability.

  Best's Executive Data Service.

The National Underwriter.

  Argus F. C. & S. Chart.

  Argus Chart of Health Insurance.

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

Weekly Underwriter.

  The Insurance Almanac.

PART 7

Prior to commencing study for this Part, the "Recommendation for Study" section, page 6, should be read 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

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major reports an insurance company makes to regulatory authorities. 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. He should have detailed familiarity with the contents, purpose, and recent changes of 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. He 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 correcting 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 & 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 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.

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(a) INSURANCE ACCOUNTING AND EXPENSE ANALYSIS

National Association of Insurance Commissioners. *Proceedings.* Blanks Committee (A-1) Reports for years 1972 through Volume I 1977 as applicable to the Fire and Casualty Blank.

(1) *Insurance Accounting*

Association form of 1976 Annual Statement Blank for Fire and Casualty Companies.

Michelbacher, G. F. Roos, N. R. *Multiple-Line Insurers, Their Nature and Operations.* 1970. Chapter 10 excluding pp. 181-202.

Strain, R. W., *Property-Liability Insurance Accounting.* 1974. Chapters 1, 2, 8, 9, 10, 12, 13, 14, 15, 16, 17, Appendices.

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.*

IASA

Year	Page	Article
1965	269	Interpretation and Analysis of Insurance Financial Statements.
1967	695	Analysis of Financial Conditions. (Both Articles).
1969	630	Thoughts About Annual Statement Reporting.
1970	687	Managerial Versus Statutory Accounting.
1974	Various	A Class in Annual Statement Preparation, Sessions 151, 251, 351, 451.

(2) *Expense Analysis*

1976 Insurance Expense Exhibit.

Strain, R. W. *Property-Liability Insurance Accounting.* 1974. Chapter 11.

New York State Regulations, Title 11, Parts 105 through 109 (Regulation 30).

Insurance Accounting and Statistical Association. *Proceedings.*

Year	Page	Article
1963	273	Review of Uniform Accounting Instructions and Methods Used by Country Mutual in Allocating Expenses.
1971	475	Allocating Investment Income.
1971	614	Allocating Investment Income.

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

(b) PREMIUM, LOSS, AND EXPENSE RESERVES

Casualty Contingencies (Draft). Chapter 15, "Reserves." (Available from CAS office.)

Association form of 1976 Annual Statement Blank for Fire and Casualty Companies. Page 3, 7, 9, 31, 36-43. *Schedules G, K, O, P*

Michelbacher, G. F. and Roos, N. R. *Multiple-Line Insurers, Their Nature and Operation.* 1970. pp. 181-202.

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

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. 83.

Bornhuetter, R. L. and Ferguson, R. E. "The Actuary and IBNR." *PCAS IX*, 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.

Student must get on their own Contact Ins. Dept. in their State

Reading Parts 7 & 9(a) - $3.00

Fitzgibbon, W. J., Jr. "Reserving for Retrospective Returns." *PCAS LII, 1965.* p. 203.
Resony, A. V. "Allocated Loss Expense Reserves." *PCAS LIX, 1972.* p. 141.

Insurance Accounting and Statistical Association. *Proceedings.*

Year	Page	Article
1955	332	Unearned Premium Reserve Accounting.
1967	171	Discussion of Active Life Reserves as Respects Loss of Time Policies.
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.*
McClenahan, C. L. "A Mathematical Model for Loss Reserve Analysis." *PCAS LXII, 1975.*

PART 8

Prior to commencing study for this Part, the "Recommendation for Study" section, page 6, should be read 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

(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.
(Note: The candidate is responsible only for the sections of the law as stated. If he 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 he may find them 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.)
Hartman, G. R. and Lange, J. T. "Rate Regulation and the Casualty Actuary-Revisited." *PCAS LV,* p. 1.
Kimball, S. L. and Denenberg, H. S. Eds. *Insurance, Government and Social Policy.* 1969. Chapter 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 1974, 1975 and 1976 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]

(b) STATUTORY INSURANCES

(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.

Insurance Information Institute. *Comparison Chart of First Party Auto Insurance Laws.* Latest edition. (Available from I.I.I. at no charge for single copies.)

Aponte, J. and Denenberg, H. S. "The Automobile Problem in Puerto Rico: Dimensions and Proposed Solution." *The Journal of Risk and Insurance.* 1968. *article*

American Insurance Association. *Analysis of Automobile Financial Responsibility and Related Laws.* (Chart). Latest edition.

~~National Associaton of Independent Insurers. *Chart Analysis of Automobile Insurance Plans.* Latest edition.~~

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.

(This text should be read for the basic background underlying Social Security Systems in the United States. Up-to-date provisions will be found in the pamphlet *Social Security Programs in the United States.* Published by the U. S. Department of Health, Education and Welfare.)

New York (State) Department of Labor. "Studies in Disability Insurance." [*Special Bulletin No. 224*].

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 "Recommendation for Study" section, page 6, should be read 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

The candidate for this part is expected to have acquired considerable technical knowledge and practical experience in insurance ratemaking. In addition, he 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 including, but not limited to, those covered in the papers listed below. The candidate's ability to apply his 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.

Kimball, S. L. and Denenberg, H. S., Eds. *Insurance, Government and Social Policy.* 1969. Chapter 11.

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.

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

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.

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.

Whitman, A. F. and Williams, C. A. "Environmental Hazards and Rating," *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.

* *Student must get on their own*
✓ *Publication #___ ... call 202-783-3238*

Bickerstaff, D. R. "Automobile Collision Deductibles and Repair Cost Groups: The Lognormal Model." *PCAS LIX*, 1972. p. 68.

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.

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 2-6.

Eilers, R. D. and Crowe, R. M., Eds. *Group Insurance Handbook.* 1965. Part IV, Chapters 13-22.

Backman, J. *Surety Rate Making.* 1948. Chapters 6-8, 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

Note: 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. 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. (This study note may be obtained from the Casualty Actuarial Society at a cost of $1.00 per copy.)

(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.
Experience Rating Plan—Mercantile Establishments.

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.

Johnson, R. A. "The Multi-Split Experience Rating Plan in New York." *PCAS XXVIII, 1941.* p. 15.

Bailey, A. L. "Workmen's Compensation D-Ratio Revision." *PCAS XXXV, 1948.* p. 26

Uhthoff, 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.

Student must get on their own

Valerius, N. M. "Risk Distributions Underlying Insurance Charges in the Retrospective Rating Plan." *PCAS XXIX, 1942.* p. 96.

Uhthoff, D. R. "Excess Loss Ratios via Loss Distributions." *PCAS XXXVII, 1950.* p. 82.

Leslie, W., Jr. "The National Defense Projects Rating Plan." *PCAS XXXVIII, 1951.* p. 174.

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.

PART 10

Prior to commencing study for this Part, the "Recommendation for Study" section, page 6, should be read 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) OPERATIONS OF INSURANCE COMPANIES

The candidate is expected to have acquired considerable technical knowledge and practical experience during preparation for previous examination parts. 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 following references are indicated for particular attention:

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. 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

Lewis, J. R. "Observations on Mass Merchandising of Property and Liability Insurance." *CPCU Annals.* June, 1971. pp. 165-180.

"Property-Liability Tests (A3) Task Force." *Proceedings*, National Association of Insurance Commissioners 1975, Vol. 1, pp. 250-340.

Stone, J. M. "A Theory of Capacity and the Insurance of Catastrophe Risks." *Journal of Risk and Insurance* Part 1 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).

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(b) REINSURANCE AND EXCESS RATING

Snader, R. H. "Fundamentals of Individual Risk Rating and Related Topics." Part III. (This study note may be obtained from the Casualty Actuarial Society at a cost of $1.00 per copy.)

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.)

Cahill, J. M. "Deductible and Excess Coverages, Liability and Property Damage Lines Other Than Automobiles." *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.

Salzmann, 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

This new section was added in response to the increasing involvement of actuaries in the forecasting and planning functions of insurance companies. The four readings required for the 1977 syllabus are of a general nature and students are advised to prepare for questions which will test his ability to apply these principles to insurance problems. The readings (other than the McGuinness article) are available at cost 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.

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

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) TOPICS OF CURRENT INTEREST

The following is a list of topics of current interest in the industry with which the candidate should be familiar. Each September the Education Committee will review the topics and establish the list from which examination questions for the following year will be drawn. Consult the Secretary for the current list of topics.

In preparing for this subject, the candidate must do his own study and research by reading articles in the general press and in trade journals, by discussing the topics with people in the industry, and by reading whatever industry papers he can obtain.

The candidate should pay particular attention *to all pertinent* papers in *Proceedings of the Casualty Actuarial Society* for the most recent four years with special attention to the reviews. The candidate should also review the 1974, 1975 and 1976 Volumes of the *Proceedings of the National Association of Insurance Commissioners* for material on these topics.

LIST OF TOPICS OF CURRENT INTEREST

Changes in the Automobile Tort Liability System.

Federal Investigations and Legislation (Fiduciary liability hazards created by the Employee Retirement Income Security Act of 1974) and Federal/State Regulation of Insurance—current inquiries into McCarren-Ferguson.

Insurance Accounting and Tax Problems.

Prepaid/Group Legal Expense.

Marketing Development (mass merchandizing and availability of insurance).

NAIC Examination of Insurance Companies (including the McKinsey Report).

National Health Insurance, including Health Maintenance Organizations.

[handwritten note:] Price level acct & Foreign exchange acct. may be purchased from Financial acct Standards Board, Publications Div, High Ridge Park, Stanford, Ct.

Problems of the High Risk Insured (e.g., FAIR plans, Facilities, Joint Underwriting Associations, assigned risk plans, windstorm pools, flood, crime).

Malpractice and Product Liability.

Problems of Risk Classification.

INDEX TO READERS

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.

AICPA. *Audits of Fire and Casualty Insurance Companies.* 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. *Analysis of Automobile Financial Responsibility and Related Laws.* (Chart) 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.

Bickelhaupt, D. L. *General Insurance.* (1974). Richard D. Irwin, 1818 Ridge Road, Homewood, Illinois 60430.

Davis, G. B. *Introduction to Electronic Computers.* (2nd Edition), (1971). McGraw-Hill Book Company, Manchester Road, Manchester, Missouri 63011.

Department of Transportation. *A Study of Assigned Risk Plans.* (1970). GPO Cat. No.—TD 1.17:As7. Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.

Department of Transportation. *Motor Vehicle Crash Losses and Their Compensation in the United States.* GPO-1971-0-420-342. Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.

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.

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

Hoel, P. G. *Introduction to Mathematical Statistics.* (4th Edition). John Wiley & Sons, Inc. 605 Third Avenue, New York, New York 10016.

Hoel, P. G., Port, S. C., and Stone, C. J. *Introduction to Probability Theory and Introduction to Statistical Theory.* Houghton Mifflin Company, Boston, Massachusetts.

Hogg, R. V. and Craig, A. T. *Introduction to Mathematical Statistics.* (3rd Edition). Mac Millan Company, 866 Third Avenue, New York, New York 10022.

Johnson, R. E., and Kiokemeister, F. L. *Calculus with Analytic Geometry.* (4th Edition). Allyn and Bacon, Inc., Rockleigh, New Jersey 07647.

Jordan, C. W. *Life Contingencies.* (2nd Edition), (1967). Society of Actuaries, 208 South LaSalle Street, Chicago, Illinois 60604.

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

Kellison, S. G. *The Theory of Interest.* (1970 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.* (4th Edition), (1968). The Ronald Press Co., 79 Madison Avenue, New York, New York 10016.

Long and Gregg, Eds. *Property and Liability Insurance Handbook.* (1965). Richard D. Irwin, Inc., 1818 Ridge Road, Homewood, Illinois 60430.

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

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

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, 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.

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. *Loss and Expense Ratios.* New York State Insurance Department, 324 State Street, Albany, New York 12210.

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.) New York State Insurance Department, 324 State Street, Albany, New York 12210.

New York (State) Laws, Statues, etc. *New York Insurance Law.* (This can be obtained from several sources, such as—The Williams Press, Inc., 99 Broadway, Menands, New York 12202; or Edward Thompson Company, 399 Gold Street, Brooklyn, New York 11201.)

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March 2, 1977

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Part 4 - Both the 1969 and 1975 editions of Wagner's Principles of Operations Research are acceptable study material:

Wagner, H. M. Principles of Operations Research. 1969.
Chapters 2, 3 (pp. 77-85), 4 (pp. 95-110), 5 (pp. 129-143),
8 (pp. 253-260), 20 (pp. 837-869) in the first edition.

or

Wagner, H. M. Principles of Operations Research. 1975.
Chapters 2, 3 (pp. 73-81), 4 (pp. 91-106), 5 (pp. 127-145),
8 (pp. 263-270), 20 (pp. 851-884) in the second edition.

and

Wagner, H. M. Principles of Operations Research. 1969.
Chapters 1, 11 (pp. 359-372), 16 (pp. 639-671), 21
(pp. 887-898), and 22.

or

Wagner, H. M. Principles of Operations Research. 1975.
Chapters 1, 11 (pp. 383-396), 16 (pp. 651-677), 21
(pp. 903-915), and 22.

Part 6 - Candidate should study:

Insurance Services Office. Automobile Statistical Plan.

Insurance Services Office. Commercial Automobile Statistical Plan.

Part 8 - Reading: American Insurance Association. Analysis of Automobile Financial Responsibility and Related Laws Chart.

Latest chart is contained in A.I.A.'s 1976 edition of Summary of Selected State Laws and Regulations Relating to Automobile Insurance. Chart is presented in pages 44-60 and notes on pages 69-71.

The pamphlet Social Security Programs in the United States can be obtained as follows:

Single copy available at no cost from the Department of Health, Education and Welfare by writing or calling (202) 655-4000.

Multiple copies available at cost of $1.40 from the United States Government Printing Office. Publication Number 1770-00218. The telephone number is (202) 783-3238.

Darrell W. Ehlert
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