

Actuarial Problem Solving Math 342

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stop by any time my door is open, or by arrangement.

Welcome! The purpose of this course is to develop knowledge of the fundamental probability tools for quantitatively assessing risk. The application of these tools to problems encountered in actuarial science is emphasized. A thorough command of probability topics and the supporting calculus is assumed. Additionally, a very basic knowledge of insurance and risk management is helpful. This course is designed to help prepare for actuarial certification and employment, focusing on the “Probability” exam P/1.

Resource: The central clearinghouse for information on the actuarial career path and the series of actuarial exams is the web site <http://www.BeAnActuary.org/>.

Learning Outcomes: Students will be able to use and apply the following concepts in a risk management context:

1. General Probability
 - Set functions including set notation and basic elements of probability
 - Mutually exclusive events
 - Addition and multiplication rules
 - Independence of events
 - Combinatorial probability
 - Conditional Probability – Non Bayes Theorem
 - Bayes Theorem / Law of total probability
2. Univariate probability distributions (including binomial, negative binomial, geometric, hypergeometric, Poisson, uniform, exponential, chi-square, beta, Pareto, lognormal, gamma, Weibull, and normal)
 - Probability functions and probability density functions
 - Cumulative distribution functions
 - Mode, median, percentiles, and moments
 - Variance and measures of dispersion
 - Moment generating functions
 - Transformations
3. Multivariate probability distributions (including the bivariate normal)
 - Joint probability functions and joint probability density functions
 - Joint cumulative distribution functions
 - Central Limit Theorem
 - Conditional and marginal probability distributions
 - Moments for joint, conditional, and marginal probability distributions
 - Joint moment generating functions
 - Variance and measures of dispersion for conditional and marginal probability

- distributions
- Covariance and correlation coefficients
- Transformations and order statistics
- Probabilities and moments for linear combinations of independent random variables

Required text: ACTEX Study Manual for the SOA Exam P and CAS Exam 1, *Samuel A. Broverman*, ACTEX Publications, ISBN 978-1-56698-745-5, <http://www.actexamdriver.com/> .

Required calculator: You will need one of the calculators approved for use by SOA and CAS: Candidates may ONLY use the battery or solar-powered Texas Instruments BA-35 model calculator, the BA II Plus*, the BA II Plus Professional*, the TI-30Xa or TI-30X II* (IIS solar or IIB battery), or TI-30X MultiView (XS Solar or XB Battery). Candidates may use more than one of the approved calculators during an examination. URL: <http://education.ti.com/>

Required reference material: You will need a resource to serve as a reference for probability and statistics. Any of the texts listed below are considered as representative of the many texts available to cover this material. Not all the topics may be covered adequately by just one text. Candidates may wish to use more than one of the following or other texts of their choosing in their preparation. Earlier or later editions may also be adequate for review.

- *Mathematical Statistics with Applications* (Seventh Edition), 2008, by Wackerly, D., Mendenhall III, W., Scheaffer, R., Chapters 1-7.
- *A First Course in Probability* (Seventh Edition), 2005, by Ross, S.M., Chapters 1-8.
- *Fundamentals of Probability, with Stochastic Processes*, (Third Edition), 2005, by Ghahramani, S., Chapters 1-11.
- *John E. Freund's Mathematical Statistics with Applications* (Seventh Edition), 2004, by Miller, I., Miller, M., Chapters 1-8.
- *Probability for Risk Management*, Second Edition 2006, by Hassett, M. and Stewart, D., Chapters 1-11. Candidates can also use the earlier edition of this text. The same chapter references apply.
- *Probability: The Science of Uncertainty with Applications to Investments, Insurance and Engineering* 2001, by Bean, M.A., Chapters 1-9.

Exams: There will be three one-hour long exams (mid Feb, mid Mar, mid April), plus a longer final exam (during exam week, May 10-16). As in the actual exam, you'll have 6 minutes per question.

Grading: Homework: 20%; Presenting your homework in class: 20%; Exams: 15% each.

About the Actuarial Exam on “Probability:” The central clearinghouse for up-to-date information on Actuarial Careers and Exams is < <http://www.BeAnActuary.org/> >.

The Probability Exam is a three-hour multiple choice examination and is referred to as Exam P by the SOA and Exam 1 by the CAS. The examination is jointly sponsored and administered by the SOA, CAS, and the Canadian Institute of Actuaries (CIA). The examination is also jointly sponsored by the American Academy of Actuaries (AAA) and the Conference of Consulting Actuaries (CCA).

The Probability Exam is administered as a computer-based test. For additional details, Please refer to “Computer- Based Testing Rules and Procedures”. A table of values for the normal distribution will be included with the examination, so candidates will not be allowed to bring copies of the table into the examination room.

Sample Semester Schedule

Date	Materials Due	Problems
19-Jan	Study manual, calculator, practice exam	
26-Jan	p. 1 -10	# 1 - 12
2-Feb	p. 11 - 20	# 13 - 26
9-Feb	p. 21 - 30	# 27 - 42
16-Feb	p. 31 - 40	# 43 - 58
23-Feb	Exam 1 (hand in review sheets)	Covers problems # 1 - 42
2-Mar	p. 41 - 50	# 59 - 74
9-Mar	p. 51 - 60	# 75 - 88
16-Mar	Spring Break	Spring Break
23-Mar	Exam 2 (hand in review sheets)	Covers problems 43 - 88
30-Mar	p. 61 - 70	# 89 - 106
6-Apr	p. 71 - 80	# 107 - 120
13-Apr	p. 81 - 90	# 121 - 137
20-Apr	Exam 3 (hand in review sheets)	Covers problems # 89 - 137
27-Apr	p. 91 - 100	# 138 - 149
4-May	Review Sheets	
Tuesday May 10	Final Exam (hand in review sheets)	Covers problems # 1 - 149

Best wishes for a successful semester!