Errata and Updates for the 1st Edition of the 2022 ACTEX Manual for Exam FAM-S

(Last updated 4/24/2023)

Page 192 **9th line from the bottom.** For the Single parameter Pareto distribution, change the second moment from $E\left[X^2\right] = \frac{2\theta^2}{\alpha-2}$ to $E\left[X^2\right] = \frac{\alpha\theta^2}{\alpha-2}$.

Page 259 **Last line of Problem 45.**

Change "1 weeks" to "13 weeks".

Page 308 **Third line of Solution of Problem 13.**

Change $E[S^{(A)}]$ to $Var[S^{(A)}]$.

Page 337 **Solution of Problem 5.**

Change **Answer C** to **Answer D**.

Page 350 **Tabe in Problem 9.**

Change Year Reported of 1997, settled in 1999 from 11 to 1, namely,

Number of Claims Settled			
Year	Year Settled		
Reported	1997	1998	1999
1997	Unknown	3	1
1998		5	2
1999			4

Page 365 **Problem 7. Before the choices.**

Add the missing question:

Determine the difference between $\widehat{S}_1(1250)$ and $\widehat{S}_2(1250)$.

Page 370 **Solution of Problem 7. Third line.**

Change $y_2 = 1200$ to $y_4 = 1200$.

Page 379 **Tenth line from the top.**

Change the last n_1 to n_3, namely,

The sum over all Category 3 points is $\frac{n_3}{\alpha} + \Sigma\left[\ln\left(d_i + \theta\right) - \ln\left(x_i + \theta\right)\right] = \frac{n_3}{\alpha} - C_3$

Page 384 **Ninth Line from the bottom.**

In (c), change the second line to:

10 insurance payment amounts: 2, 4, 5, 5, 8, 10, 12, 15 and 2 limit payments of 20 each

Page 394 **Solution of Problem 15.**

Change the last four lines to:

$$Y = \ln\left(\frac{21}{20}\right) + \ln\left(\frac{22}{20}\right) + \ln\left(\frac{25}{20}\right) + \ln\left(\frac{26}{20}\right) + 2 \times \ln\left(\frac{29}{20}\right) + \ln\left(\frac{33}{20}\right) + \ln\left(\frac{35}{20}\right)$$
$$+ 2 \times \ln\left(\frac{30}{20}\right) + \ln\left(\frac{28}{25}\right) + \ln\left(\frac{30}{25}\right) + \ln\left(\frac{35}{25}\right) + \ln\left(\frac{42}{25}\right) + 2 \times \ln\left(\frac{30}{25}\right) = 4.7596$$

and $Z = 8 + 4 = 12$ (number of non-censored values).

The mle of $\frac{1}{\alpha}$ is .397, so the mle of α is 2.52.

Page 438 **Problem 11(b). First line.**

Change "readability: to "credibility".

Page 438 **Problem 12. Sixth and eighth lines.**

Change "readability: to "credibility".

Page 443 **Problem 29. Sixth line.**

Change "readability: to "credibility".

Page 471 **Solution of Problem 1. Sixth line.**

Change (i) to (ii).

Page 471 **Solution of Problem 1. Tenth line.**

Change "tow" to "two".

Page 475 **Table 29.2.**

Change "Incremental Loss Payments" to "Cumulative Loss Payments".

Page 520 **Solution of Example 32.1. First line.**

Change $\max\{100 - S_1\ ,\ 0\}$ to $\max\{90 - S_1\ ,\ 0\}$.

Page 524 **Second graph**

Change the upper-upper node from 66.75 to 66.25.

Page 533 **Last line.**

Change the last formula to

$$100,000 \times 0.0696 = 6,960.$$

Page 540 **Before Problem 6**, change "The number of prizes, N, and prize amounts, X, have the following distributions:" to

The number of prizes, N, and prize amounts, X are independent of one another and, have the following distributions:

N: $\quad P[N = 1] = 0.8, \quad P[N = 2] = 0.2$

X: $\quad P[X = 0] = 0.2, \quad P[X = 100] = 0.7, \quad P[X = 1000] = 0.1$

Page 563 **Choice D of Problem 3.** Change $\dfrac{1 - .5e^{-r}}{1.5}$ to $\dfrac{2e^{-r} - 1}{1.5}$.

Page 565 **Choice A of Problem 1.** Change 2500 to 1,500.

Page 570 Change the **solution of Problem 3** to:

The risk neutral probability of the stock price dropping to $0.5S_0$ is $q = \frac{2-e^{-r}}{1.5}$. The price of the option is the expected present value

$$e^{-r} \times [q \times 1 + (1-q) \times 0] = \frac{2e^{-r} - 1}{1.5}.$$

Answer D

Page xv The following Introductory Comments were added:

INTRODUCTORY COMMENTS

The FAM exam is divided almost equally into FAM-S and FAM-L topics. This study guide is designed to help in the preparation for the Society of Actuaries FAM-S Exam.

The first part of this manual consists of a summary of notes, illustrative examples and problem sets with detailed solutions. The second part consists of 4 practice exams. The SOA exam syllabus for the FAM exam indicates that the exam is 3.5 hours in length with 40 multiple choice questions. The practice exams in this manual each have 20 questions, reflecting the fact that FAM-S is 50% of the full FAM exam. The appropriate time for the 20 question FAM-S practice exams in this manual is one hour and forty-five minutes.

The level of difficulty of the practice exam questions has been designed to be similar to those on past exams covering the same topics. The practice exam questions are not from old SOA exams.

I have attempted to be thorough in the coverage of the topics upon which the exam is based, and consistent with the notation and content of the official references. I have been, perhaps, more thorough than necessary on reviewing maximum likelihood estimation.

Because of the time constraint on the exam, a crucial aspect of exam taking is the ability to work quickly. I believe that working through many problems and examples is a good way to build up the speed at which you work. It can also be worthwhile to work through problems that you have been done before, as this helps to reinforce familiarity, understanding and confidence. Working many problems will also help in being able to more quickly identify topic and question types. I have attempted, wherever possible, to emphasize shortcuts and efficient and systematic ways of setting up solutions. There are also occasional comments on interpretation of the language used in some exam questions. While the focus of the study guide is on exam preparation, from time to time there will be comments on underlying theory in places that I feel those comments may provide useful insight into a topic.

The notes and examples are divided into 32 sections of varying lengths, with some suggested time frames for covering the material. There are almost 180 examples in the notes and over 440 exercises in the problem sets, all with detailed solutions. The 4 practice exams have 20 questions each, also with detailed solutions. Some of the examples and exercises are taken from previous SOA exams. Some of the problem set exercises are more in depth than actual exam questions, but the practice exam questions have been created in an attempt to replicate the level of depth and difficulty of actual exam questions. In total there are almost 700 examples/problems/sample exam questions with detailed solutions. ACTEX gratefully acknowledges the SOA for allowing the use of their exam problems in this study guide.

I suggest that you work through the study guide by studying a section of notes and then attempting the exercises in the problem set that follows that section. The order of the sections of notes is the order that I recommend in covering the material, although the material on pricing and reserving in Sections 27 to 31 is independent of the other material on the exam. The order of topics in this manual is not the same as the order presented on the exam syllabus.

It has been my intention to make this study guide self-contained and comprehensive for the FAM-S Exam topics, however it is important to be familiar with original reference material on all topics.

While the ability to derive formulas used on the exam is usually not the focus of an exam question, it is useful in enhancing the understanding of the material and may be helpful in memorizing formulas. There may be an occasional reference in the review notes to a derivation, but you are encouraged to review the official reference material for more detail on formula derivations.

In order for the review notes in this study guide to be most effective, you should have some background at the junior or senior college level in probability and statistics. It will be assumed that you are reasonably familiar with differential and integral calculus. The prerequisite concepts to modeling and model estimation are reviewed in this study guide. The study guide begins with a detailed review of probability distribution concepts such as distribution function, hazard rate, expectation and variance. Of the various calculators that are allowed for use on the exam, I am most familiar with the BA II PLUS. It has several easily accessible memories. The TI-30X IIS has the advantage of a multi-line display. Both have the functionality needed for the exam.

There is a set of tables that has been provided with the exam in past sittings. These tables consist of some detailed description of a number of probability distributions along with tables for the standard normal and chi-squared distributions. The tables can be downloaded from the SOA website www.soa.org.

If you have any questions, comments, criticisms or compliments regarding this study guide, please contact the publisher ACTEX, or you may contact me directly at the address below. I apologize in advance for any errors, typographical or otherwise, that you might find, and it would be greatly appreciated if you would bring them to my attention. ACTEX will be maintaining a website for errata that can be accessed from www.actexmadriver.com. It is my sincere hope that you find this study guide helpful and useful in your preparation for the exam. I wish you the best of luck on the exam.

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