

Errata and updates for ASM Exam C/Exam 4 Manual (Eighth Edition 2nd Printing) sorted by date

Warning: Practice exam question 2:39 is defective.

- [2/14/2010] On page 500, on the third line from the bottom of the page, change 5(1) to 1(5) and $5(1^2)$ to $1(5^2)$ in the two numerators.
- [2/11/2010] On page 492, in the solution to exercise 31.25, on the first line, $g(x)$ should be $g(\mu, \sigma)$. On the last line, $g(X, y)$ should be $g(\mu, \sigma)$.
- [2/9/2010] On page 277, on the first line of the solution to exercise 18.16, move the first left parenthesis into the sum and put a bar on the X: $\frac{\sum(X_i - \bar{X})^2}{n-1}$.
- [2/5/2010] On page 330, on the last line of Example 23B, delete the comma after “interval”.
- [2/5/2010] On page 338, in the solution to exercise 23.11, change $z_{0.025}$ to $z_{0.95}$ and $z_{0.05}$ to $z_{0.975}$ in two places.
- [2/4/2010] On page 685, in exercise 45.13, two lines above the table, after **53,409**, add (C).
- [1/30/2010] On page 567, in exercise 38.16, on the third line, change “payments of 10,000” to “payments of 9,500”.
- [1/30/2010] On page 571, in the solution to exercise 38.10, on the last line of the table, change 0.0057 to 0.0053.
- [1/24/2010] On page 35, in the solution to exercise 2.4, on the fourth line, change $\text{Var}(mn)$ to $\text{Var}(mN)$.
- [12/10/2009] On page 852, in Section 56.2, on the first line of 1, change “expected observations” to “predictive expected value”. On the second line of Example 56B, change “expected number of observations” to “expected number of claims”.
- [12/10/2009] On page 873, in the solution to exercise 57.3, on the 7th line, change 80,000 in the numerator to 180,000.
- [12/9/2009] On page 823, in the solution to exercise 53.19, three lines from the end, change 0.375 to 0.0375.
- [12/9/2009] On page 828, in the solution to exercise 53.36, on the second line, add the words “the square of” before “the length”.
- [12/8/2009] On page 697, in the Reading paragraph at the top, there should be an “or” after *Loss Models* Third Edition 20.3.1–20.3.3; SN C-21-01 4 is a distinct option.
- [12/8/2009] On page 718, in the solution to exercise 46.28, replace the second displayed line with

$$= -\frac{e^{-2\theta}}{2(1 - e^{-k})} \Big|_0^k$$

- [12/8/2009] On page 719, on the last line of the solution to exercise 46.29, replace the fraction with $\frac{0.021845-0.014006}{0.021845-0.007776}$.
- [12/8/2009] On page 728, exercise 47.19 is the same as exercise 11.5.
- [12/8/2009] On page 732, in the solution to exercise 47.21, on the second line, change both y’s to n’s.
- [12/8/2009] On page 740, 2 lines from the bottom of the page, change $4(0.6)^4$ to $3(0.6)^4$.
- [12/7/2009] On page 581, on the first line of the second paragraph, add “is” after “it”.
- [12/7/2009] On page 645, in the answer to Example 43C, replace 47 with 11.
- [12/7/2009] On page 664, in the solution to exercise 44.15, on the fourth line, replace 47 with 11.
- [12/7/2009] On page 689, in the solution to exercise 45.21, on the line after “We are given that the weighted posterior sum . . .”, change $\frac{1}{12}(3)$ to $\frac{2}{12}(3)$.

[12/7/2009] On page 690, in the solution to exercise 45.24, on the fourth line, change $0.2(60,000)$ to $0.1(60,000)$.

[12/6/2009] On page 398, in footnote 1, change $f(1000^-)$ and $f(1000)$ to $F(1000^-)$ and $F(1000)$.

[12/2/2009] On pages 199–200, the solution to exercise 13.23 is too complicated, and has some typos. Here is a better solution:

This exercise is harder than the previous one, since the deductible now affects claim frequency. There are two ways we can do the exercise:

1. We can let N_P be the number of payments and Y^P the payment per payment.
2. We can let N be the number of losses and Y^L the payment per loss, or

Both methods require work. I think the first method is easier, but will demonstrate both ways.

First method The negative binomial has $r\beta = 0.3$ and $r\beta(1 + \beta) = 0.6$, so $\beta = 1$, $r = 0.3$. The probability of a loss above 3000 is

$$\Pr(X > 3000) = \left(\frac{\theta}{3000}\right)^\alpha = \left(\frac{2000}{3000}\right)^3 = \frac{8}{27}$$

The modified negative binomial has $r = 0.3$, $\beta = 8/27$, so its moments are

$$\mathbf{E}[N_2] = \frac{2.4}{27} = 0.088889 \quad \text{Var}(N_2) = \frac{0.3(8)(35)}{27^2} = 0.115226$$

Y^P is a two-parameter Pareto with modified parameters with parameters $\theta = 3000$ and $\alpha = 3$. Using the tables to calculate its mean and variance:

$$\begin{aligned} \mathbf{E}[Y^P] &= \frac{\theta}{\alpha - 1} = \frac{3000}{3 - 1} = 1500 \\ \mathbf{E}[(Y^P)^2] &= \frac{2\theta^2}{(\alpha - 1)(\alpha - 2)} = \frac{2(3000^2)}{2} = 3000^2 \\ \text{Var}(Y^P) &= 3000^2 - 1500^2 = 6,750,000 \end{aligned}$$

The variance of aggregate payments is

$$\text{Var}(S) = \mathbf{E}[N^P] \text{Var}(Y^P) + \text{Var}(N^P) \mathbf{E}[(Y^P)^2]^2 = (0.088889)(6,750,000) + (0.115226)(1500^2) = \boxed{859,259}$$

Second method We computed the mean and variance of Y^P in the first method. Therefore,

$$\mathbf{E}[Y^L] = \mathbf{E}[Y^P] \Pr(X > 3000) = \left(\frac{8}{27}\right)(1500) = 444.444$$

The variance is computed by treating Y^L as a compound distribution. The primary distribution is Bernoulli with $q = \Pr(X > 3000)$ and the secondary is Y^P .

$$\text{Var}(Y^L) = \left(\frac{8}{27}\right)(6,750,000) + \left(\frac{8}{27}\right)\left(\frac{19}{27}\right)(1500^2) = 2,469,136$$

The variance of aggregate payments is

$$\text{Var}(S) = 0.3(2,469,136) + 0.6(444.444^2) = \boxed{859,259}$$

- [12/2/2009] On page 235, in the solution to exercise 15.12, on the fifth line, change 0.1 to 0.01.
- [12/2/2009] On page 242, on the line above equations (16.3), change m_k^0 and m_k^1 to m_0^k and m_1^k .
- [12/1/2009] On page 161, in the solution to exercise 11.11, change “if” to “it”.
- [12/1/2009] On page 197, in the solution to exercise 13.17, on the third displayed line, change 0.596 to 0.6.
- [12/1/2009] On page 204, in the solution to exercise 13.36, on the last line, change the 79,875 in the denominator to 79,375.
- [12/1/2009] On page 1216, in the solution to question 18, on the second line from the end, change ruls to rule.
- [11/30/2009] On page 46, in the solution to exercise 3.6, on the second line of the second paragraph, in the sentence beginning “The expected value . . .”, delete “by the Bernoulli shortcut”. On the second line from the end, delete a plus sign between 0.0064 and 0.183125.
- [11/30/2009] On page 107, in the solution to exercise 7.22, on the third line of the page, change 1.5147^2 to 1.5174^2 .
- [11/30/2009] On page 113, in the solution to exercise 7.48, on the fourth line, change “them” to “the”. On the second displayed line, change the denominator $2000 + 5000$ to $2000 + 500$.
- [11/30/2009] On page 135, in the solution to exercise 9.1, on the fourth line from the end, delete the extra 0 at the end of 440,0000.
- [11/30/2009] On page 136, in the solution to exercise 9.6, on the second displayed line, insert an equal sign between 100 and c .
- [11/30/2009] On page 196, in the solution to exercise 13.15, on the 5th line, replace “variance” with “second moment”.
- [11/29/2009] On page 19, in the solution to exercise 1.10, change “Generalized Pareto” to “Burr”.
- [11/29/2009] On page 21, in the solution to exercise 1.17, on the first displayed line, insert a minus sign in front of $\frac{d \ln S(x)}{dx}$. On the last line, $\ln 0.06$ should be $\ln 0.6$.
- [11/29/2009] On page 23, on the last line of the solution to exercise 1.23, change 0.035764 to 0.035674.
- [11/10/2009] On pages 115–116, in the answer to Example 8A, $F_Y(2)$ should be $F_Y(0)$. This error occurs three times: 2 lines from the bottom of page 115, second non-display line on page 116, and last displayed line of the answer.
- [11/9/2009] On page 342, in the solution to exercise 23.31, on the last line, change 0.1439 to 0.01439.
- [11/8/2009] On page 1225, in the solution to question 18, on the 4th displayed line, remove the minus sign before $\frac{1}{3\theta^2}$.
- [11/7/2009] On page 1044, question 39 is defective.
- [11/7/2009] On page 1116, the solution to question 39 is incorrect. The second moment of the hypothetical means of aggregate losses is not the product of the second moment of the hypothetical means of frequency and severity. Discard this question.
- [11/7/2009] On page 1128, the solution to question 39 is incorrect. The second moment of the hypothetical means of aggregate losses is not the product of the second moment of the hypothetical means of frequency and severity. Discard this question.
- [11/6/2009] On page 373, on the fifth line of Subsection 26.1.2, change “the the” to “to the”.
- [11/4/2009] On page 902, on the 5th line after the answer to Example 59A, change $F(u) \leq 500$ to $u \leq F(500)$.
- [11/2/2009] On page 1139, in the solution to question 33, on the 7th line, remove the 2 in front of $e^{-5/10}$.
- [10/25/2009] On page 224, on the third displayed line of the page, the upper limit $[d/h] - 1$ should be replaced with $[d/h]$.
- [10/15/2009] On page 1102, in the solution to question 6, on the second displayed line, replace A with B .
- [10/13/2009] On page 1177, the answer key for question 15 should be (A) instead of (D).

[10/11/2009] On page 752, in the solution to exercise 50.6, on the third displayed line, remove the last two minus signs in the exponent, replacing the last one with a plus, so that the exponent is $-\theta\left(\frac{1}{100} + \sum \frac{1}{x_i}\right)$.

[10/11/2009] On page 799, in the solution to exercise 52.38, replace the last sentence with

$$Z = \frac{138/49}{138/49 + 22/21} = \frac{414}{414 + 154} = \frac{414}{568} = \frac{207}{284} > \frac{18}{29}$$

[10/4/2009] On page 692, in the solution to exercise 45.28, on the displayed line, replace the two 24's in the numerator and denominator with 32's.

[9/25/2009] On page 763, in the solution to exercise 51.2, on the first displayed line, change 0.2(1) to 0.1(2).

[9/25/2009] On page 765, in the solution to exercise 51.8, replace the second paragraph with

$Z = n/(n + v/a)$. Decreasing a will increase k , increase the denominator, and decrease the fraction, so the second statement is true. Decreasing v will decrease k , decrease the denominator, and increase the fraction, so the third statement is false.

[9/23/2009] On page 269, on the 6th line of the second paragraph of Section 18.3, delete "a" before "boundary points".

[9/23/2009] On page 823, in the solution to exercise 53.20, replace the sixth displayed line with

$$\mathbf{E}[P^2] = \mathbf{E}[P] - v = 0.1 - \frac{106}{1200} = \frac{7}{600}$$

[9/15/2009] On page 434, in the solution to exercise 28.17,

- On the first displayed line, put an exponent 8 on $S(10; k)$.
- On the third displayed line, replace θ with k .

[9/15/2009] On page 460, in the solution to exercise 29.21, on the 3rd and 2nd lines from the end of the page, replace 10,000 with 100,000 in four places.

[9/15/2009] On page 713, in the solution to exercise 46.9, on the first displayed line of the page, change $\frac{1}{3(4^{x_4+1})}$ to $\frac{3}{4^{x_4+1}}$.

[9/6/2009] On page 737, in the solution to exercise 48.5, on the first line, change 20,000 to 2000.

[9/4/2009] On page 163, on the 4th line of Subsection 12.2, delete "or a claim limit". Frequency is unaffected by a claim limit.

[9/4/2009] On page 626, on the third line after the enumerated list, replace "average" with "expected" and replace "800" with "900".

[9/2/2009] On page 1049, in question 18, on the second line, change 60 to 30.

[9/2/2009] On page 1135, in the solution to question 18, on the second line, change 60 to 30.

[8/29/2009] On page 442, change the first and second displayed lines to

$$2^\tau = \frac{\ln 0.05}{\ln 0.35}$$

$$\tau = \frac{\ln \frac{\ln 0.05}{\ln 0.35}}{\ln 2} = \boxed{1.512764}$$

[8/29/2009] On page 466, in the solution to exercise 29.40, on the last displayed line of the solution, change the last numerator to $6 \sum \ln y_i$.

- [8/29/2009] On page 469, in the solution to exercise 29.48, on the second displayed line, change $14 \ln 0.6$ to $6 \ln 0.6$.
- [8/29/2009] On page 480, on the first displayed line in the answer to Example 31G, change the numerator from θ to θ^n .
- [8/27/2009] On page 874, in the solution to question 57.4, the first two lines on the page should read

$$\frac{36 - x}{2} = \pm 8$$

$$x = \boxed{20, 52}$$

- [8/25/2009] On page 479, in the first sentence of Subsection 31.2.1, add the word “negative” before “the expected value”.
- [8/25/2009] On page 479, on the fifth displayed line of the page, replace $I(\mathbf{x})$ with $I(\theta)$, and put a negative sign before **E**. On the seventh displayed line, change $\frac{2\bar{x}}{\theta^3}$ to $\frac{2n\bar{x}}{\theta^3}$.
- [8/24/2009] On page 242, on the 10th line the page, change m_1^0 to m_0^1 .
- [8/21/2009] On page 170, in the solution to exercise 12.11, change $\frac{b-d}{d}$ to $\frac{b-d}{b}$.
- [8/18/2009] On page 417, on the 6th and 7th lines of the answer to Example 28B, change 50! to 60!
- [8/12/2009] On page 368, in exercise 25.6, on the last line, change “loss” to “paid claim”.
- [8/11/2009] On page 76, the solution to exercise 5.18 does not reflect SOA normal distribution rounding rules. A corrected solution is

We need to calculate a . First we calculate $F(100)$.

$$\Phi\left(\frac{\ln 100 - 3}{2}\right) = \Phi(0.80) = 0.7881$$

For the given Pareto, $S(100) = \left(\frac{3}{4}\right)^2 = 0.5625$. Therefore, a must be $(1 - 0.7881)/0.5625 = 0.3767$. Then

$$\Pr(X > 200) = 0.3767 \left(\frac{300}{300 + 200}\right)^2 = (0.3767)(0.36) = \boxed{0.1356}$$

- [8/6/2009] On page 643, one line above equation (43.3), delete a redundant “number of”.
- [8/4/2009] On page 8, in Section 1.3, $\Pr(B) \neq 0$ and $f(y) \neq 0$ are necessary for the definitions of conditional probability.
- [8/4/2009] On page 10, on the fourth line of Section 1.4, add “independent”: “...if X is the sum of independent random variables ...”. On the second line from the end of the section, add “independent”: “...if X is the sum of independent random variables ...”.
- [8/4/2009] On page 26, one line after Example 2A, add the word “independent”: “...from n independent identically distributed ...”.
- [8/3/2009] On page 374, on the 4th lines of Examples 26B and 26C, delete “are assumed”.
- [7/30/2009] On page 353, on the line before the third displayed equation, change “from the variance” to “from the second moment”.
- [7/28/2009] On page 127, in the solution to exercise 8.12, on the fourth displayed line, 5^2 should be 5.
- [7/22/2009] On pages 232–233, in the solution to exercise 15.2, on the 6th and 7th lines, change p_0 to f_0 . On the first displayed line of page 233, change f_1 to p_1 .

- [7/17/2009] On page 106, in the solution to exercise 7.21, on the second line, replace $\Pr(X > 1000)$ with $\Pr(X > 500)$. On the fourth line, replace $\Pr(X > 2000)$ with $\Pr(X > 500)$.
- [7/10/2009] On page 117, in exercise 8.1, delete the word “average” on the last line.
- [7/9/2009] On page 22, in the solution to exercise 1.21, on the 7th line, change $g(x)$ to $g(n)$.
- [7/9/2009] On page 27, on the second displayed line, change 0.4889 to 0.5367.
- [7/3/2009] On page 84, eighth line, add the word “and”: $x = F^{-1}(y) = \text{VaR}_y(X)$ and $dy = F'(x)dx = f(x)dx$.
- [7/2/2009] On page xiv, on the third line of the fourth paragraph of “Tables”, change 0.8859 to 0.8860.
- [6/8/2009] On page 436, in the solution to exercise 28.24, the second displayed line has three errors, and should read

$$\frac{1}{2} \frac{dg}{d\theta} = -\frac{30}{\theta^2} \left(\frac{30}{\theta} - 5 \right) - \frac{45}{\theta^2} \left(\frac{45}{\theta} - 5 \right) + \frac{75}{\theta^2} \left(10 - \frac{75}{\theta} \right) = 0$$

- [5/18/2009] On page 11, replace part 4 of the answer to Example 1F with
Any number x such that $\Pr(X < x) \leq 0.8$ and $\Pr(X \leq x) \geq 0.8$ is an 80th percentile. This is true for $3 \leq x \leq 5$. In fact, the graph of the distribution is horizontal between 3 and 5. So the set of 80th percentiles is $\{x : 3 \leq x \leq 5\}$.
- [5/15/2009] On page 1134, in the solution to question 13, change the last displayed line to

$$x > \frac{1418 - \sqrt{1,943,748}}{2(2)} = 5.95409$$

- [5/13/2009] On page 1058, in question 15, on the last line, change “number of dental” to “number of major dental”.
- [5/12/2009] On page 1117, in the solution to question 9, on the second displayed line, add an r_u to the denominator:

$$\sum_{u \leq t} \frac{s_u}{r_u(r_u - s_u)} = \frac{0.0024}{0.81}$$

- [5/12/2009] On page 1228, the solution to question 31 is incorrect. The correct solution is
 $D(3000)$ is observed (or empirical) minus fitted, or $i/n - F^*(3000)$. In the p - p plot, t is fitted, but s is an adjusted observed, $i/(n+1)$, so $s - t = 1/(n+1) - F^*(3000)$. Therefore

$$(s - t) - D(3000) = \frac{4}{7} - F^*(3000) - \frac{1}{2} + F^*(3000) = \frac{4}{7} - \frac{1}{2} = -\frac{1}{14} = \boxed{-0.0714} \quad (\mathbf{B})$$

- [5/11/2009] On page 1170, in the answer key, the answer to question 18 should be D instead of C.
- [5/11/2009] On page 1180, the solution to question 22 is incorrect starting with the first line on the page, where -1.59 should be -1.58 . Replace the four lines on top of the page with:

$$\begin{aligned} &= e^{0.15} \Phi(-1.58) \\ &= (1.162)(1 - 0.9429) = 0.06634 \end{aligned}$$

Dividing by the probability of being below the 10th percentile (0.1), we get 0.6634. $\mathbf{E}[S_t \mid S_t < 30.243] = 0.6634S_0 = 0.649(40) = 26.54$, so the average payoff is $35 - 26.54 = \boxed{8.46}$. (A)

[5/11/2009] On page 1257, in the solution to question 37, replace the phrase starting with “with mean” to the end of the sentence with:

with mean $F(300) = 1 - e^{-3}$ and variance $F(300)(1 - F(300)) = (1 - e^{-3})e^{-3}$, so the coefficient of variation squared is $e^{-3}/(1 - e^{-3}) = 0.05240$.

[5/10/2009] On page 1223, in the solution to question 10, on the sixth and seventh lines of the page, interchange **(D)** and **(E)**.

[5/4/2009] On page 195, the solution to exercise 13.10 is incorrect. The correct solution is:

For each insured, the Poisson parameter over two years is $\Lambda = 2\lambda$. Since $\mathbf{E}[\Lambda] = 2\mathbf{E}[\lambda]$ and $\text{Var}(\Lambda) = 4\text{Var}(\lambda)$, the parameter Λ follows a gamma distribution with mean 1 and variance 2. Let N be the number of losses over the two-year period. Then $\mathbf{E}[N] = \mathbf{E}[E[N | \Lambda]] = \mathbf{E}[\Lambda] = 1$ and the variance of N is

$$\text{Var}(N) = \mathbf{E}[\text{Var}(N | \Lambda)] + \text{Var}(\mathbf{E}[N | \Lambda]) = \mathbf{E}[\Lambda] + \text{Var}(\Lambda) = 1 + 2 = 3$$

For 1500 insureds, the aggregate mean is 1500 and the aggregate variance is $1500(3) = 4500$. We make a continuity correction and check the probability that a normal distribution with these parameters is greater than 1600.5:

$$\begin{aligned} \Pr(N > 1600) &= 1 - \Phi\left(\frac{1600.5 - 1500}{\sqrt{4500}}\right) \\ &= 1 - \Phi(1.50) = 1 - 0.9332 = \mathbf{0.0668} \end{aligned}$$

[4/7/2009] On page 377, in the first sentence of the answer to Example 26G, replace “harmonic mean” with “average of the reciprocals”.

[4/7/2009] On page 897, in the solution to exercise 58.14, on the second displayed line, change two minus signs to plus signs:

$$\hat{\alpha} = \frac{\sum_{i=1}^r m_i(\bar{x}_i - \bar{x})^2 - (\hat{\alpha} + \hat{\mu} + \hat{\mu}^2)(r - 1)}{D}$$

[4/2/2009] On page 164, the paragraph after Example 12A up to the end of the lesson are incorrect. Replace them with the following:

The same parameter that gets multiplied by v in the $(a, b, 0)$ class gets multiplied by v in the $(a, b, 1)$ class. p_0 is then the balancing item, $1 - \sum_{k=1}^{\infty} p_k$. The textbook gives formulas for p_0^M in all cases (Table 8.3). Rather than memorizing the table, use the following formula:

$$1 - p_0^{M*} = (1 - p_0^M) \left(\frac{1 - p_0^*}{1 - p_0} \right)$$

where asterisks indicate distributions with revised parameters. This formula works even when the unmodified distribution is improper (so that unmodified probabilities are negative or greater than 1), as in the ETNB family. This is illustrated in the following example:

EXAMPLE 12B Frequency of claims per year follows a zero-modified negative binomial distribution with $r = -0.5$, $\beta = 1$, and $p_0^M = 0.7$. Claim size follows a Pareto with $\alpha = 1$, $\theta = 1000$, and is independent of claim frequency.

A deductible of 500 is imposed.

Calculate the probability of no claims payments in a year.

ANSWER: The probability of a payment given a claim is the Pareto survival function at 500:

$$S(500) = \frac{\theta}{\theta + 500} = \frac{1000}{1500} = \frac{2}{3}$$

The revised negative binomial parameters are $r^* = -0.5$, $\beta^* = 2/3$. By the equation above:

$$1 - p_0^M = 0.3$$

$$1 - p_0 = 1 - \left(\frac{1}{1 + \beta}\right)^r = 1 - \left(\frac{1}{2}\right)^{-0.5} = -0.4142$$

$$1 - p_0^* = 1 - \left(\frac{1}{5/3}\right)^{-0.5} = -0.2910$$

$$1 - p_0^{M*} = 0.3 \left(\frac{-0.2910}{-0.4142}\right) = 0.2108$$

$$p_0^{M*} = 1 - 0.2108 = \boxed{0.7892}$$

□

[3/31/2009] On page 919, in the solution to exercise 59.25, on the last line, change the first 1.415 to 0.243:

$$30\bar{X} - 5 = 30\left(\frac{0.510 + 0.662 + 0.243}{3}\right) - 5 = 10(1.415) - 5 = \boxed{9.150} \quad (\text{A})$$

[3/20/2009] On page 999 three lines from the bottom, replace $dF(d)$ with $dS(d)$.

[3/14/2009] On page 1008, in the solution to exercise 68.13, on the second displayed line, delete 100 before dy .

[3/11/2009] On page 772, in the first displayed equation on the page, change the numerator 14.5 to 3.36.

[3/8/2009] On page 996, in Figure 67.1, add $(1 - 0.95)$ before the second $\text{CTE}_{0.95}$: The shaded area is $(1 - 0.95) \text{CTE}_{0.95} \dots$

[3/8/2009] On page 997, on the fourth line from the bottom, change the last Z on the page to X .

[3/7/2009] On page 909, in exercise 59.16, on the third line, change n to m .

[3/3/2009] On page 116, there are two references to the textbook's Theorem 5.14, which is based on the second edition. In the third edition of *Loss Models*, it is Theorem 8.8.

[3/1/2009] On page 621, on the last line of the answer to Example 42A, there should be 200 before the brackets of $\frac{10000/6}{(100/3)^2}$.

[2/28/2009] On page 366, in the answer to Example 25D, change the four "1" subscripts on p 's and q 's to "0"'s, and the eight "2" subscripts to "1"'s. However, as indicated above, you can skip this example since it is not on the syllabus any more.

[2/28/2009] In Table C.2 on page 1261, change the following entries, which are currently NS:

- F00:32 should be 13
- SOA exams F04:19 should be 17
- SOA exams F05:38 should be 13

[2/21/2009] On page 194, in the solution to exercise 13.8, the conditional variance formula is used, not the compound variance formula. On the first line, change "compound distribution" to "conditional".

[2/21/2009] On page 268, one line above the second displayed line on the page, equation (9.3) in the second edition of *Loss Models* is equation (12.3) in the third edition of *Loss Models*.

[2/21/2009] On page 293, in the solution to exercise 20.13, on the third line, replace $1 - S(2)$ with $S(2)$.

[2/17/2009] On page 509, in the solution to exercise 32.16, on the last line, replace the second p_1 with p_0 .

- [2/17/2009] On page 851, on the two lines before Example 56A, replace \bar{X} with $E[X]$ in two places, and replace \bar{Y} with $E[Y]$. (The same replacement should be made in the solution to exercise 56.1, but it so happens that in that exercise $E[X] = \bar{X}$ and $E[Y] = \bar{Y}$.)
- [2/15/2009] On page 514, in the answer to Example 33B, replace $H_0(67)$ with $H_0(68) - H_0(67)$ and replace $H(67|z_1 = 1)$ with $H(68 | z_1 = 1) - H(67 | z_1 = 1)$.
- [2/14/2009] On page 225, on the third line of the second paragraph, change $\lceil \frac{2.8}{2} \rceil - 1 = 0$ to $\lceil \frac{2.8}{2} \rceil - 1 = 1$.
- [2/7/2009] On page 109, in the solution to exercise 7.36, on the first two displayed lines, change X to X' .
- [2/4/2009] On page 76, in the solution to exercises 5.17, on the first line, change $F(200)$ to $S(200)$.
- [2/4/2009] On page 77, in the paragraph beginning "Let $f_2(x) \dots$ ", at the end of the first line, change the numerator $(3)(500^2)$ to $(3)(500^3)$.
- [2/4/2009] On page 85, on the third line of the answer to Example 6D, change $\frac{S_i}{K}$ to $\frac{K}{S_i}$.
- [2/3/2009] On page 470, the solution to exercise 29.51 is incorrect. The correct solution is:

The conditional probability of a payment greater than 1000, given that the loss is above 1000, is

$$\Pr(X > 2000 | X > 1000) = \frac{1 - F(2000)}{1 - F(1000)} = \frac{1 - e^{-\theta/2000}}{1 - e^{-\theta/1000}}$$

Let $x = e^{-\theta/2000}$. Then we can express this probability as

$$\Pr(X > 2000 | X > 1000) = \frac{1 - x}{1 - x^2} = \frac{1}{1 + x}$$

By the Bernoulli technique, this probability is the proportion of payments in the range, or $\frac{80}{80+20} = 0.8$. Then

$$\begin{aligned} \frac{1}{1 + x} &= 0.8 \\ x &= 0.25 \\ e^{-\theta/2000} &= 0.25 \end{aligned}$$

The first quartile of (ground up) losses, or the 25th percentile, is π such that $F(\pi) = 0.25$, or

$$e^{-\theta/\pi} = 0.25$$

But we have already shown that $e^{-\theta/2000} = 0.25$, so $\pi = \boxed{2000}$.

- [1/27/2009] On page 605, in the solution to exercise 40.10, on the last line, in the last numerator, 2 should be an exponent: $(10 - 5)^2$.
- [1/27/2009] On page 1160, in the solution to question 16, on the first displayed line, change K/S_0 to S_0/K .
- [1/27/2009] On page 1193, in the solution to question 14, on the first line, change $\Pr(S_1/S_0)$ to $\Pr((S_{1/2}/S_0) > 1)$.
- [1/26/2009] On page 227, in exercise 15.7, on the displayed line, $f(x)$ should be $f(n)$.
- [1/26/2009] On page 1151, in the solution to question 28, on the 5th through 3rd lines from the bottom of the page, replace 0.055268 with 0.052268 and replace 0.55268 with 0.52268 three times.
- [1/24/2009] On page 85, in line with McDonald's recent errata, the phrase "mean annual continuously compounded return" in exercises 6.1 and 6.2 should be replaced with "continuously compounded mean annual return".
- [1/24/2009] On page 751, in exercise 50.8, on the second displayed line, change $g(x)$ to $g(\theta)$.
- [1/24/2009] On page 1119, in the solution to question 13:

1. In the first table, on the line $y = 8$, change 0.28333 to 1.28333.
2. On the third line after the first table, change “Dividing these by 0.8” to “Dividing these by 0.6”.
3. In the first two displayed lines, change the denominators 0.722888 to 0.541619.

[1/21/2009] On page 207, in the solution to exercise 13.50, a continuity correction is needed. Replace the sentence beginning with “The probability of paying out” with the following

We need the probability of paying out more than 250. Since the aggregate distribution is discrete, this is the same as the probability of paying out at least 500, and we need to make a continuity correction. We’ll calculate the probability of paying out more than 375, the midpoint of (250, 500).

$$1 - \Phi\left(\frac{375 - 43.13}{\sqrt{23,906.25}}\right) = 1 - \Phi(2.15) = 1 - 0.9842 = \boxed{0.0158} \quad (\text{A})$$

[1/20/2009] On page 21, in the solution to exercise 1.19, two lines from the bottom of the page, change the denominator x to m .

[1/17/2009] On page 312, in the solution to exercise 21.21, delete the line and the phrase “Opt2.5ex” from the upper left cell of the table. That cell should only have y_i in it.

[1/17/2009] On page 312, in the solution to exercise 21.29, the reference to the new edition of *Loss Models* is to the 2nd edition, although the comment applies equally well to the third edition.

[1/17/2009] On page 917, in the solution to exercise 59.13, capitalize “Integrate” on the first line. The last two lines should read

$$\begin{aligned} x &= 2\sqrt[3]{u} \\ &= 2\sqrt[3]{0.125} = 1 \quad (\text{E}) \end{aligned}$$

[1/15/2009] On page 38, in the solution to exercise 2.17, on the third displayed line, replace $E[X | \Lambda]$ with $S(x | \Lambda)$. On the fifth displayed line, replace the exponent α with $-\alpha$. You will then have

$$\begin{aligned} S(x) &= E_{\Lambda} [S(x | \Lambda)] = E_{\Lambda} [e^{-\Lambda x^{1/3}}] \\ &= M_{\Lambda} (-x^{1/3}) \\ &= (1 + \theta x^{1/3})^{\alpha} \end{aligned}$$

[1/8/2009] On page 44, in the solution to exercise 3.2, on the last line of the page, change the mathematical expression to $\frac{1}{2}(80) + \frac{1}{2}(160) = 120$.

[1/7/2009] On page 35, in the list of additional released exam questions, delete CAS3-F05:32.

[1/7/2009] On page 693, in the solution to exercise 45.29, on the third line of the page, the left hand side should be $E(X_2 | X_1)$.

[12/30/2008] In Table C.3 on page 1262, lessons 4, 5, and 6 are interchanged. A corrected version of the table is at the end of this list.

[12/21/2008] On page 23, in the solution to exercise 1.22, on the last line, the SOA rounding convention requires replacing the last equality with $1 - \Phi(0.61) = \boxed{0.2709}$.

[12/21/2008] On page 208, in the solution to exercise 13.53, on the last line, there should be an equals sign before the final answer: $1 - 0.6293 = \boxed{0.3707}$.

[12/10/2008] Concerning lesson 25 (pages 363–366), the third edition of *Loss Models*, which is now the official edition for the syllabus (although you may still use the second edition), no longer has the notation P_j , α , and β , so you are no

longer responsible for their meanings. Instead, you should determine from the circumstances what is an appropriate assumption. For deductibles and limits, it is reasonable to assume that all observations occur above the deductible and below or at the limit. For a time-to-failure study, lives entering at the beginning may be assumed to enter before failure and lives surviving at the end of the study may be assumed to leave after all failures. For other lives, you must determine whether it is more reasonable to assume they enter and leave uniformly within each interval or they enter before all failures in the interval and leave after all failures in the interval.

The third edition does not provide double-decrement formulas, so you are not responsible for the displayed equation in Section 25.2, nor for Example 25D and exercise 25.7. You are still responsible for estimating single-decrement rates ($q^{(i)}$) in a multiple-decrement situation.

[12/2/2008] On page 105, in the solution to exercise 7.16, on the second line, delete one of the “such that $E[X \wedge d]$ ”s.

[11/27/2008] On page 66, on the first line after the second displayed line, put “dx” after $S(x)$.

Table C.3: Lessons corresponding to practice exam questions

Question Number	Practice Exams						
	1	2	3	4	5	6	7
1	1	1	1	23	37	47	17
2	19	40	43	18	7	29	62
3	23	28	47	47	35	3	22
4	42	2	18	8	53	46	47
5	40	29	29	40	67	57	31
6	45	17	3	28	55	37	48
7	52	61	26	26	40	54	4
8	4	28	24	18	18	22	14
9	62	23	61	24	9	15	20
10	52	57	57	37	25	24	52
11	28	14	50	21	15	61	41
12	25	28	10	65	21	8	10
13	49	21	58	49	23	45	57
14	59	27	33	23	62	20	6
15	26	10	22	2	28	2	28
16	52	49	15	45	6	26	52
17	17	62	4	10	61	28	40
18	61	13	28	31	53	26	16
19	22	30	45	4	16	46	5
20	10	20	52	33	31	7	56
21	58	21	17	9	29	62	61
22	66	22	21	17	46	67	43
23	34	25	7	54	29	35	15
24	13	7	25	2	61	17	61
25	38	55	29	28	57	46	67
26	63	38	61	54	32	27	36
27	29	21	27	46	45	10	22
28	24	45	63	12	10	18	7
29	28	35	41	24	7	64	52
30	12	24	41	37	36	26	8
31	57	54	9	53	44	44	29
32	33	31	28	45	3	13	29
33	53	5	16	23	60	21	21
34	6	26	20	59	42	61	24
35	31	68	6	66	58	37	35
36	8	53	68	14	46	53	46
37	28	61	46	27	41	23	27
38	18	46	53	45	22	33	18
39	27	52	31	42	13	5	59
40	37	44	59	68	17	44	49