Errata and updates for ASM Exam C/Exam 4 Manual (Eighth Edition) sorted by page

Warning: Practice exam 2:39 is defective. Practice exam question 5:6 is changed below.

[7/2/2009] On page xiv, on the third line of the third paragraph of "Tables", change 0.8859 to 0.8860.

[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 ...".

[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 $\boxed{\{x : 3 \leq x \leq 5\}}$.

[12/21/2008] On page 21, in the solution to exercise 1.17, on the first displayed line, insert a minus sign in front of $\frac{\mathrm{d} \ln S(x)}{\mathrm{d}x}$.

[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.

[7/9/2009] On page 22, in the solution to exercise 1.21, on the 7th line, change $g(x)$ to $g(n)$.

[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 $1 - \Phi(0.61) = \boxed{\mathbf{0.2709}}$.

[9/28/2008] On page 23, in the solution to exercise 1.23, on the 7th line, change "X can't be negative" to "Y can't be negative".

[8/4/2009] On page 26, one line after Example 2A, add the word "independent": "... from n independent identically distributed ...".

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

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

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

[1/8/2009] On page 45, in the solution to exercise 3.2, on the second line of the second paragraph, change the mathematical expression to $\frac{1}{2}(80) + \frac{1}{2}(160) = 120$.

[8/31/2009] On page 46, in the solution to exercise 3.6, on the second line from the end, delete a plus sign between 0.0064 and 0.183125.

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

[2/4/2009] On page 76, in the solution to exercises 5.17, on the first line, change $F(200)$ to $S(200)$.

[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

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

[2/4/2009] On page 77, in the paragraph beginning "Let $f_2(x)\ldots$", at the end of the first line, change the numerator $(3)(500^2)$ to $(3)(500^3)$.

[8/6/2008] On page 83, the paragraph after Definition 1, there are 2 typos in the first 3 sentences. The following replacement is clearer:

To calculate $E[S_t|S_t < K]$, we carry out two steps. The first step is to integrate the lognormal random variable S_t/S_0 over its probability density function from 0 to K/S_0, and multiply it by S_0. The result of S_0 times the integral is the partial expectation of S_t.

[2/4/2009] On page 85, on the third line of the answer to Example 6D, change $\frac{S_t}{K}$ to $\frac{K}{S_t}$.

[8/6/2008] On page 85, on the last line before the exercises, a t is missing from the first exponent: $S_0 e^{(\alpha-\delta)t}$.

[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".

[8/2/2008] On page 89, in the second paragraph, change the first sentence to

A *franchise deductible d* means that if the loss is less than or equal d, nothing is paid, but if the loss is higher than d, the full amount is paid.

[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.

[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 $\Pr(X > 500)$>

[2/7/2009] On page 109, in the solution to exercise 7.36, on the first two displayed lines, change X to X'.

[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.

[7/10/2009] On page 117, in exercise 8.1, delete the word "average" on the last line.

[7/7/2008] On page 120, in exercise 8.16, add after "You are given:": "X has a continuous distribution. Some values for X's distribution function and limited expected values are given in the following table:".

[7/28/2009] On page 127, in the solution to exercise 8.12, on the fourth displayed line, 5^2 should be 5.

[9/28/2008] On page 132, on the second line, change "must by" to "must be".

[9/7/2008] On page 142, on the 5th line of the answer to Example 10B, replace "Then $c\ldots$" through the end of the paragraph with

Then the ratio of each modified probability to the $(a, b, 0)$ probability is $\frac{c}{1-p_0}$, so $\frac{c}{1-p_0} = \frac{p_1^M}{p_1} = \frac{0.4}{0.25} = \frac{8}{5}$. By the definition of c as $1 - p_0^M$,

[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.

[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:

$$\begin{aligned}
1 - p_0^M &= 0.3 \\
1 - p_0 &= 1 - \left(\frac{1}{1+\beta}\right)^r = 1 - \left(\frac{1}{2}\right)^{-0.5} = -0.4142 \\
1 - p_0^* &= 1 - \left(\frac{1}{5/3}\right)^{-0.5} = -0.2910 \\
1 - p_0^{M*} &= 0.3\left(\frac{-0.2910}{-0.4142}\right) = 0.2108 \\
p_0^{M*} &= 1 - 0.2108 = \boxed{\mathbf{0.7892}}
\end{aligned}$$

□

[8/21/2009] On page 170, in the solution to exercise 12.11, change $\frac{b-d}{d}$ to $\frac{b-d}{b}$.

[9/28/2008] On pages 191–192, some of the notation is inaccurate. Replace the paragraph starting with "Let U be claim size" and the following 3 displayed lines with

Let U be claim size. We would like to calculate

$$\text{Var}(U) = \text{Var}_I(E_U[U \mid I]) + E_I[\text{Var}_U(U \mid I)]$$

Let's calculate $\text{Var}_I(E_U[U \mid I])$.

$$\begin{aligned}
E_I[E_U[U \mid I]] &= E_I[200, 1000, 100, 1500] \\
&= 0.2(200) + 0.3(1{,}000) + 0.4(100) + 0.1(1{,}500) = 530 \\
E_I[E_U[U \mid I]^2] &= E_I[200^2, 1000^2, 100^2, 1500^2] \\
&= 0.2(200^2) + 0.3(1{,}000^2) + 0.4(100^2) + 0.1(1{,}500^2) = 537{,}000 \\
\text{Var}_I(E_U[U \mid I]) &= E_I[E_U[U \mid I]^2] - E_I[E_U[U \mid I]]^2 \\
&= 537{,}000 - 530^2 = 256{,}100
\end{aligned}$$

[2/21/2009] On page 193, 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".

[5/4/2009] On page 194, 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 $\mathbf{E}[N] = E[E[N \mid \Lambda]] = \mathbf{E}[\Lambda] = 1$ and the variance of N is

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

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:

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

[9/20/2008] On page 199, in the solution to exercise 13.24, on the last two lines, change 0.6085 to 0.60 in 2 places.

[1/21/2009] On page 206, 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).

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

[12/21/2008] On page 206, in the solution to exercise 13.52, on the last line, there should be an equals sign before the final answer: $1 - 0.6293 = \boxed{\mathbf{0.3707}}$.

[8/5/2008] On pages 215–216, the solution to exercise 14.3 starting with "The Poisson rate" is incorrect. The correct solution starting from that point is

Let N be the number of coins picked up in half an hour. Then

$$\begin{aligned}\Pr(N = 0) &= \frac{1}{11}\sum_{\lambda=0}^{\infty}\left(\frac{10}{11}\right)^{\lambda} e^{-0.5\lambda} \\ &= \frac{1}{11}\sum\left(\frac{10}{11e^{0.5}}\right)^{\lambda} \quad \text{a geometric series} \\ &= \frac{1}{11}\left(\frac{1}{1 - 10/11e^{0.5}}\right) = 0.20265 \\ \Pr(N = 1) &= \frac{1}{11}\sum_{\lambda=0}^{\infty} 0.5\lambda\left(\frac{10}{11}\right)^{\lambda} e^{-0.5\lambda} \\ &= \frac{1}{22}\sum_{\lambda=1}^{\infty}\lambda\left(\frac{10}{11e^{0.5}}\right)^{\lambda} \\ &= \frac{1}{22}\left(\frac{10/11e^{0.5}}{(1 - 10/11e^{0.5})^2}\right) = 0.12454 \\ \Pr(N \geq 2) &= 1 - 0.20265 - 0.12454 = \boxed{\mathbf{0.6728}}\end{aligned}$$

[8/5/2008] On page 222, on the 4th line, change $\Pr(S \geq 2.8)$ to $\Pr(S > 2.8)$.

[10/25/2009] On page 222.2, on the third displayed line of the page, the upper limit $\lceil d/h \rceil - 1$ should be replaced with $\lfloor d/h \rfloor$.

[7/19/2008] On the last line of page 222, the formula is incorrect. The upper bound of the sum should be one lower, and a parenthesis is missing after the last S. The corrected formula is

$$E[S \wedge d] = \sum_{j=0}^{u-1} hS(hj) + (d - hu)S(hu)$$

where $u = \lceil d/h - 1 \rceil$. If $u - 1 < 0$ (for example if $d = 1$ and $h = 2$), the sum is empty and only the second term is used.

[1/26/2009] On page 225, in exercise 15.7, on the displayed line, $f(x)$ should be $f(n)$.

[7/22/2009] On pages 230–231, 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 231, change f_1 to p_1.

[10/17/2008] On page 231, in the solution to exercise 15.4, on the 5th displayed line, add "1 + after the left parenthesis:

$$\Pr(S \geq 20) = 1 - (1 + 2.5 + 4.625 + 6.35417)e^{-5} = 0.9024$$

[8/24/2009] On page 240, on the 10th line the page, change m_1^0 to m_0^1.

[9/8/2008] On page 241, in exercise 16.2, add the word "binomial" after the word "negative" on the second line.

[9/8/2008] On page 243, in the solution to exercise 16.5, on the last line of the page, replace 0.0966745 with 0.225871.

[9/23/2009] On page 267, on the 6th line of the second paragraph of Section 18.3, delete "a" before "boundary points".

[2/21/2009] On page 291, in the solution to exercise 20.13, on the third line, replace $1 - S(2)$ with $S(2)$.

[1/17/2009] On page 312, in the solution to exercise 21.21, delete the line and the phrase "0pt2.5ex" from the upper left cell of the table. That cell should only have y_i in it.

[7/30/2009] On page 351, on the line before the third displayed equation, change "from the variance" to "from the second moment".

[9/28/2008] On page 351, in the last bullet, $f()$ should be $f(x)$.

[12/10/2008] Concerning lesson 25 (pages 361–364), 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 table.

[8/14/2008] On page 363, in the second line of the answer to Example 25B, replace r_1 with r_0.

[8/2/2008] On page 364, in the first displayed line on the page, $q_j^{(\tau)}$ and $p_j^{(\tau)}$ should have only one set of parentheses in the exponent.

[2/28/2009] On page 364, 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.

[8/12/2009] On page 366, in exercise 25.6, on the last line, change "loss" to "paid claim".

[11/6/2009] On page 371, on the fifth line of Subsection 26.1.2, change "the the" to "to the".

[8/3/2009] On page 372, on the 4th lines of Examples 26B and 26C, delete "are assumed".

[4/7/2009] On page 375, in the first sentence of the answer to Example 26G, replace "harmonic mean" with "average of the reciprocals".

[8/18/2009] On page 415, on the 6th and 7th lines of the answer to Example 28B, change 50! to 60!

[9/15/2009] On page 432, 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.

[6/8/2009] On page 434, in the solution to exercise 28.24, the second displayed line has three errors, and should read

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

[8/2/2008] On page 437, on the second line of the paragraph under "Weibull distribution", the first word should be "then" instead of "the".

[9/8/2008] On page 451, in exercise 29.41, the column "Years of Disability" should be $(1, 2)$ instead of $(0, 1)$ and $[2, \infty)$ instead of $[1, \infty)$.

[9/15/2009] On page 456, in the solution to exercise 29.21, on the 8th and 9th lines, replace 10,000 with 100,000 in four places.

[8/29/2009] On page 462, 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 464, in the solution to exercise 29.47, on the second displayed line, change $14\ln 0.6$ to $6\ln 0.6$.

[7/10/2008] On page 468, delete the footnote, and replace the last complete paragraph on the page with the following:[1]

The estimate for μ is based purely on the first and last observations. Thus it is not improved by more frequent observations, only by a longer time period. As a result it is not very accurate. We can see this mathematically. If the time from the first to last observation is t and the period is broken up into n periods, the mean of the lognormal for each interval is $\frac{\mu t}{n}$ and the variance for each interval is $\frac{\sigma^2 t}{n}$. The estimator for $\frac{\mu t}{n}$, the sample mean of the logs, has variance equal to the variance of the distribution divided by n, or $\frac{\sigma^2 t}{n^2}$. Thus the variance of the estimate of μ is $\left(\frac{n^2}{t^2}\right)\left(\frac{\sigma^2 t}{n^2}\right) = \frac{\sigma^2}{t}$, which does not depend on n.

For example, if the period is one year and we knew that the standard deviation $\sigma = 0.3$ the standard deviation of the estimator for μ, would be 0.3 and there would be a 95% probability of the sample mean being in an interval of width $2(1.96)(0.3) = 1.176$ centered at μ. This is a huge interval.

[8/25/2009] On page 475, in the first sentence of Subsection 31.2.1, add the word "negative" before "the expected value".

[8/25/2009] On page 475, on the fifth displayed line of the page, replace $I(\mathbf{x})$ with $I(\theta)$, and put a negative sign before $\mathbf{E}$. On the seventh displayed line, change $\frac{2\bar{x}}{\theta^3}$ to $\frac{2n\bar{x}}{\theta^3}$.

[1] I thank Ken Burton for pointing this out to me.

[9/14/2008] On page 476, in the answer to Example 31G, on the first displayed line, eliminate the 3 from the radical—it's a square root, not a cube root. On the second displayed line, move the θ^2 into the exponent as follows:

$$L(\theta) = \frac{1}{\theta^{2n}} e^{-\sum x_i^2/\theta^2}$$

Also, 5 lines from the end, the second moment is $\theta^2\Gamma(2) = \theta^2$ (not times $\Gamma(1.5)$. As a result, the true information equals the observed information and the first line of the page is incorrect.

[8/14/2008] On page 538, in the last 2 lines of the solution to exercise 36.5, replace 0.9784 in two places by 0.9415 and replace the final answer 0.3759 with 0.3900.

[1/27/2009] On page 597, in the solution to exercise 40.10, on the last line, in the last numerator, 2 should be an exponent: $(10 - 5)^2$.

[9/4/2009] On page 618, on the third line after the enumerated list, replace "average" with "expected" and replace "800" with "900".

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

[8/6/2009] On page 635, one line above equation (43.3), delete a redundant "number of".

[9/13/2008] On page 679, in the solution to exercise 45.18, in the table, on the second line, the number under Side Wall should be 2 instead of 1.

[10/4/2009] On page 684, in the solution to exercise 45.28, on the displayed line, replace the two 24's in the numerator and denominator with 32's.

[1/7/2009] On page 685, in the solution to exercise 45.29, on the third line of the page, the left hand side should be $E(X_2 \mid X_1)$.

[9/6/2009] On page 727, in the solution to exercise 48.5, on the first line, change 20,000 to 2000.

[1/24/2009] On page 741, in exercise 50.8, on the second displayed line, change $g(x)$ to $g(\theta)$.

[10/11/2009] On page 742, 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 $-\theta\left(\frac{1}{100} + \sum \frac{1}{x_i}\right)$.

[3/11/2009] On page 762, in the first displayed equation on the page, change the numerator 14.5 to 3.36.

[10/11/2009] On page 789, in the solution to exercise 52.38, replace the last sentence with

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

[9/23/2009] On page 813, in the solution to exercise 53.20, replace the sixth displayed line with

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

[2/17/2009] On page 839, 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 $E[Y] = \bar{Y}$.)

[9/26/2008] On page 872, replace the first paragraph of Section 58.2 after the word "cryptic" with

Suppose θ_i is the probability of submitting a claim for group i. Either only one claim is possible or we are not interested in the number of claims. Then the number of members in group i submitting claims in period j, assuming

it has m_{ij} members in that period, is binomial with parameters m_{ij} and θ_i. We have that the hypothetical mean for each member of group i is θ_i and the process variance is $\theta_i(1-\theta_i)$. Then we can relate a, the variance of the hypothetical means, to μ and v as follows:

$$\begin{aligned}\mu &= E[\theta_i] \\ v &= E[\theta_i(1-\theta_i)] = E[\theta_i] - E[\theta_i^2] \\ a &= \text{Var}(\theta_i) = E[\theta_i^2] - E[\theta_i]^2 \\ &= -v + \mu - \mu^2\end{aligned}$$

[4/7/2009] On page 885, in the solution to exercise 58.14, on the second displayed line, change two minus signs to plus signs:

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

[11/4/2009] On page 890, on the 5th line after the answer to Example 59A, change $F(u) \le 500$ to $u \le F(500)$.

[3/7/2009] On page 897, in exercise 59.16, on the third line, change n to m.

[1/17/2009] On page 905, in the solution to exercise 59.13, capitalize "Integrate" on the first line. The last two lines should read

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

[3/8/2009] On page 984, in Figure 67.1, add $(1-0.95)$ before the second $\text{CTE}_{0.95}$: The shaded area is $(1-0.95)\,\text{CTE}_{0.95}$ ....

[9/7/2008] On page 985, on the third displayed line, change $\ln x$ to $\ln Q_\alpha$.

[9/7/2008] On the last 3 lines of page 985, Q_α is the α quantile of a standard normal distribution, not of Z.

[3/20/2009] On page 987 three lines from the bottom, replace $dF(d)$ with $dS(d)$.

[9/7/2008] On page 994, in the solution to exercise 67.12, on the last two lines, replace the two 86.40's with 85.40 and replace the final answer with 25.40.

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

[10/11/2008] On page 1026, in question 13, change $\widehat{\Pr}(3 < X < x | X < 10)$ to $\widehat{\Pr}(3 < X < x \mid X < 10)$.

[11/7/2009] On page 1039, question 29 is defective.

[9/2/2009] On page 1037, in question 18, on the second line, change 60 to 30.

[5/13/2009] On page 1058, in question 15, on the last line, change "number of dental" to "number of major dental".

[11/2/2008] On page 1054, in question 6, add the word "annual" on the first line before "number of claims". On the third line, change "number of claims" to "number of years of experience".

[10/15/2009] On page 1090, in the solution to question 6, on the second displayed line, replace A with B.

[10/11/2008] On page 1093, in the solution to question 13, on the third and fourth displayed lines, change dq to dq'.

[5/12/2009] On page 1105, in the solution to question 9, on the second displayed line, add an r_u to the denominator:

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

[1/24/2009] On page 1107, in the solution to question 13:

1. Change $\widehat{\Pr}(3 < X < x | X < 10)$ to $\widehat{\Pr}(3 < X < x \mid 3 < X < 10)$ in the six places it appears.
2. In the first table, on the line $y = 8$, change 0.28333 to 1.28333.
3. On the third line after the first table, change "Dividing these by 0.8" to "Dividing these by 0.6".
4. In the first two displayed lines, change the denominators 0.722888 to 0.541619.

[10/19/2008] On page 1114, in the solution to question 35, on the 5th line, there should be a radical over the second $\text{Var}(X)\,\text{Var}(Y)$: $\rho\sqrt{\text{Var}(X)\,\text{Var}(Y)} \le \sqrt{\text{Var}(X)\,\text{Var}(Y)}$.

[5/15/2009] On page 1122, in the solution to question 13, change the last displayed line to

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

[9/2/2009] On page 1123, in the solution to question 18, on the second line, change 60 to 30.

[11/2/2009] On page 1127, in the solution to question 33, on the 7th line, remove the 2 in front of $e^{-5/10}$.

[9/28/2008] On page 1137, in the solution to question 22, on the fifth line, change "must by" to "must be".

[1/26/2009] On page 1139, 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.

[11/2/2008] On page 1146, in the solution to question 9, on the third displayed line, change the denominator of the second integral from k to x.

[1/27/2009] On page 1148, in the solution to question 16, on the first displayed line, change K/S_0 to S_0/K.

[11/2/2008] On page 1149, in the solution to question 18, on the third displayed line, replace $E[HM^2]$ with $E\left[(N \mid \alpha)^2\right]$, where N is the number of claims.

[5/11/2009] On page 1158, in the answer key, the answer to 18 should be D instead of C.

[10/13/2009] On page 1165, the answer key for question 15 should be **(A)** instead of (D).

[5/11/2009] On page 1168, 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:

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

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 $35 - 26.54 =$ $\boxed{\mathbf{8.46}}$. **(A)**

[1/27/2009] On page 1181, in the solution to question 14, on the first line, change $\Pr(S_1/S_0)$ to $\Pr((S_{1/2}/S_0) > 1)$.

[5/10/2009] On page 1210, in the solution to question 10, on the sixth and seventh lines of the page, interchange **(D)** and **(E)**.

[11/8/2009] On page 1212, in the solution to question 18, on the 4th displayed line, remove the minus sign before $\frac{1}{3\theta^2}$.

[5/12/2009] On page 1215, 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

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

[5/11/2009] On page 1244, 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 $e^{-3}/(1 - e^{-3}) = 0.05240$.

[2/28/2009] In Table C.2 on page 1249, 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

[12/30/2008] In Table C.3 on page 1250, lessons 4, 5, and 6 are interchanged. A corrected version of the table is at the end of this list.

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