Errata and updates for ASM Exam P Manual (First Edition) sorted by page

Practice Exam 2:16, 2:22, and 6:25 are defective in that none of the five answer choices is correct.

[1/10/2018] On page xi, on the last line, change "at 2" to "at 3".

[2/19/2018] On page xii, on line 14, change $x = 1 \Rightarrow x = 0$ to $x = 1 \Rightarrow y = 0$.

[11/28/2017] On page xii, on the fifth line, change $\int_0^2$ to $\int_0^3$.

[4/2/2017] On page 7, in exercise 1.10, statements (iv) and (vi) are inconsistent. Here is a revised question:

An insurance company finds that among its policyholders:

(i) Each one has either health, dental, or life insurance.
(ii) 81% have health insurance.
(iii) 36% have dental insurance.
(iv) 24% have life insurance.
(v) 5% have all three insurance coverages.
(vi) 14% have dental and life insurance.
(vii) 12% have health and life insurance.

Determine the percentage of policyholders having health insurance but not dental insurance.

[4/2/2017] On page 14, here is the solution to the revised version of exercise 1.10:

Since everyone has insurance, the union of the three insurances has probability 1. If we let H, D, and L be health, dental, and life insurance respectively, then

$$\begin{aligned}1 &= P[H \cup D \cup L]\\ &= P[H] + P[D] + P[L] - P[H \cap D] - P[H \cap L] - P[D \cap L] + P[H \cap D \cap L]\\ &= 0.81 + 0.36 + 0.24 - P[H \cap D] - 0.14 - 0.12 + 0.05\\ &= 1.20 - P[H \cap D]\end{aligned}$$

so $P[H \cap D] = 0.20$. Since 81% have health insurance, this implies that $0.81 - 0.20 =$ **61%** have health insurance but not dental insurance.

[1/26/2018] On page 20, 3 lines above Example 2C, remove the extra comma after "type 1".

[8/24/2017] On page 56, in the solution to exercise 4.11, on the last line, change 0.001/0.0071 to 0.0001/0.0071.

[11/7/2017] On page 84, in the Proof of Alternative Formula for Mean, on the third line, change $c = 1$ to $c = -1$. On the last line, change $1 - F(x) = 0$ to $\bigl(1 - F(x)\bigr)x = 0$.

[3/30/2017] On page 86, on the second-to-last line of the page, change "maximum" to "minimum".

[9/23/2017] On page 91, in exercise 7.12, on the fourth line, change "$a > 0$" to "$a > -1$".

[1/4/2017] On page 95, in the solution to exercise 7.5, the second and third integrands should have multiplied $\bigl|x - \mathbf{E}[X]\bigr|$ by the density function $f(x) = x/2$ rather than by x. As a result, the correct answer is 32/81, not 64/81. Replace everything past the third line with:

$$\begin{aligned}
\int_0^{4/3} \frac{x}{2}\left|x-\mathbf{E}[X]\right|\mathrm{d}x &= \int_0^{4/3} \frac{1}{2}\left(\frac{4}{3}x - x^2\right)\mathrm{d}x\\
&= \frac{1}{2}\left(\frac{4}{3}\frac{x^2}{2} - \frac{x^3}{3}\right)\Bigg|_0^{4/3}\\
&= \frac{(4/3)^3}{4} - \frac{(4/3)^3}{6} = \frac{(4/3)^3}{12} = \frac{16}{81}\\
\int_{4/3}^{2} \frac{x}{2}\left|x-\mathbf{E}[X]\right|\mathrm{d}x &= \int_{4/3}^{2} \frac{1}{2}\left(x^2 - \frac{4}{3}x\right)\mathrm{d}x\\
&= \frac{1}{2}\left(\frac{x^3}{3} - \frac{4}{3}\frac{x^2}{2}\right)\Bigg|_{4/3}^{2}\\
&= \frac{2^3}{6} - \frac{(4/3)(4)}{4} - \frac{(4/3)^3}{6} + \frac{(4/3)^3}{4} = \frac{(4/3)^3}{12} = \frac{16}{81}
\end{aligned}$$

The sum of the two integrals is $\boxed{\frac{32}{81}}$. **(C)**

[9/4/2017] On page 97, in the solution to exercise 7.10, on the line for $F(1^-)$, remove the negative sign before $\frac{1}{8}$.

[9/23/2017] On page 98, in the solution to exercise 7.13, on the second line from the end, insert "0.05" before "$K(1/3 + 2/4 + 3/5)$".

[6/12/2017] On page 114, in the solution to exercise 8.12, on the third line, change the left side to $1 - F(2000)$.

[6/12/2017] On page 131, in the solution to exercise 10.10, on the second line, change "4 from 8, $\binom{8}{4}$" to "4 from 9, $\binom{9}{4}$".

[8/6/2017] On page 162, replace the solution to exercise 12.12 with the following:

With no deductible, the expected payment for a uniform distribution is the midpoint of the interval, or 500.

With a deductible d, the expected payment is the probability that the loss is above the deductible, $1 - d/1000$, times the midpoint of the payment after the deductible, $(1000 - d)/2$. So we want

$$\begin{aligned}
\left(1 - \frac{d}{1000}\right)\left(\frac{1000-d}{2}\right) &= 0.25(500) = 125\\
\left(\frac{1000-d}{1000}\right)\left(\frac{1000-d}{2}\right) &= 125\\
(1000-d)^2 &= 125(2)(1000) = 250{,}000\\
1000 - d &= 500\\
d &= \boxed{500} \qquad \textbf{(C)}
\end{aligned}$$

[5/8/2017] On page 177, on the second line, change $\mathbf{E}[g(x,y)]$ to $\mathbf{E}[g(X,Y)]$.

[12/8/2017] On page 188, in the solution to exercise 14.9, on the second line, change "if equal" to "is equal".

[5/9/2017] On page 209, in the solution to exercise 15.16, on the second line on the left side, change $c_i \sum X_i$ to $\sum c_i X_i$.

[3/25/2017] On page 225, in the solution to exercise 16.9, on the second line, replace $f_Y(y)$ with $f_X(x)$.

[7/20/2017] On page 232, replace the second line with

$$\operatorname{Var}(Y \mid X = 0.2) = \frac{0.316}{0.648} - \left(\frac{0.424}{0.648}\right)^2 = \boxed{\mathbf{0.059518}}$$

[8/13/2017] On page 237, in the solution to exercise 17.2, on the displayed line, replace $\Pr(A \cup B)$ with $\Pr(A \cap B)$.

[9/4/2017] On page 239, in the solution to exercise 17.7, on the first displayed line, change $f_X(5)$ to $f_X(0.5)$.

[3/13/2017] On page 242, in the solution to exercise 17.15, replace all lines after the fourth with:

Thus the conditional distribution of Y given $X = 1.5$ is

$$f(y \mid X = 1.5) = \frac{(1.5 + y)/8}{5/8} = \frac{1.5 + y}{5} \qquad \text{for } 0 < y < 2$$

The first and second moments of $Y \mid X = 1.5$ are

$$\int_0^2 y\left(\frac{1.5 + y}{5}\right)\mathrm{d}y = \left.\frac{0.75y^2 + y^3/3}{5}\right|_0^2 = \frac{17}{15}$$
$$\int_0^2 y^2\left(\frac{1.5 + y}{5}\right)\mathrm{d}y = \left.\frac{0.5y^3 + y^4/4}{5}\right|_0^2 = \frac{8}{5}$$

The conditional variance is

$$\frac{8}{5} - \left(\frac{17}{15}\right)^2 = \frac{71}{225} = \boxed{\mathbf{0.315556}}$$

[7/20/2017] On page 253, replace the solution to exercise 18.7 with:

Use the double expectation formula. Let W be the sentence and X be the amount of time in prison. Then

$$\begin{aligned}\mathbf{E}[X] &= \Pr(\text{parole})\,\mathbf{E}[X \mid \text{parole}] + \big(1 - \Pr(\text{parole})\big)\,\mathbf{E}[X \mid \text{no parole}]\\ &= \frac{2}{3}\,\mathbf{E}[X \mid \text{parole}] + \frac{1}{3}(4.5)\end{aligned}$$

To calculate $\mathbf{E}[X \mid \text{parole}]$, we use the double expectation formula again. Let $Y = X \mid \text{parole}$. If $W < 4$, then the criminal is expected to serve 2 years; otherwise he is expected to serve $W/2$.

$$\mathbf{E}[Y] = \Pr(W < 4)\,\mathbf{E}[Y \mid W < 4] + \Pr(W \ge 4)\,\mathbf{E}[Y \mid W \ge 4] = \frac{1}{3}(2) + \frac{2}{3}(2.5) = \frac{7}{3}$$

Putting our two calculations together,

$$\mathbf{E}[X] = \frac{2}{3}\left(\frac{7}{3}\right) + \frac{1}{3}(4.5) = 3\tfrac{1}{18} = \boxed{\mathbf{3.05556}}$$

[3/30/2017] On page 259, two lines above equation (19.1), and also in equation (19.1), replace $(1-p)^{1-k}$ with $(1-p)^{n-k}$.

[3/30/2017] On page 263, in equation (19.1), replace $(1-p)^{1-k}$ with $(1-p)^{n-k}$.

[3/30/2017] On page 278, on the ninth line, change “one more” to “one less”.

[8/13/2017] On page 278, in formula (20.8), replace $i = 1$ at the bottom of the summation sign with $i = 0$.

[7/24/2017] On page 289, in the solution to exercise 20.21, on the fist line of the page, change "admission" to "admissions". On the third line of the page, change (0.2^2) to (0.2).

[8/13/2017] On page 316, in the solution to exercise 22.15, on the third displayed line, replace $\mathrm{d}y$ with $\mathrm{d}x$.

[8/4/2017] On page 331, in the solution to exercise 23.3, on the second-to-last line, put Φ before $\left(\dfrac{-3}{\sqrt{4}}\right)$.

[9/11/2017] On page 345, in the solution to exercise 24.5, on the fourth line, replace $\rho^2(1-\sigma_Y^2)$ with $\sigma_Y^2(1-\rho^2)$.

[9/14/2017] On page 345, in the solution to exercise 24.8, onthe second line, change $\mathbf{E}[X \mid Y - 10]$ to $\mathbf{E}[X \mid Y = 10]$.

[6/12/2017] On page 357, in the solution to exercise 25.11, on the fifth line, change "loss size" to "payout". On the sixth line, replace "do no" with "do not".

[8/15/2017] On page 357, in the solution to exercise 25.12, on the last line of the page, change 2,000,000 to 1,000,000.

[6/12/2017] On page 361, on the tenth and eleventh lines, change Y_i to Y.

[3/30/2017] On page 375 three lines from the bottom, and also on page 376 two lines from the bottom of Table 27.1, change $\exp(t_1X + t_xY)$ to $\mathbf{E}[\exp(t_1X + t_2Y)]$.

[6/16/2017] On page 376 in Table 27.1 on the last line, change the argument (0) to (0,0) in both places, and change $\dfrac{\partial^2 M}{\partial t_i \partial t_j}$ to $\dfrac{\partial^2 M}{\partial t_1 \partial t_2}$.

[8/16/2017] On page 379, in exercise 27.13, on the displayed line, put a negative sign in front of the first ∞ on the right.

[6/22/2017] On page 381, in exercise 27.21, on the first line, delete "independent".

[8/15/2017] On page 381, in the solution to exercise 27.1, on the second to last line of the page, delete the negative sign after the equals sign.

[8/16/2017] On page 391, on the second line of the answer to Example 28C, change $\sqrt{(}y)$ to $\sqrt{y}$. On the fourth line, change $|h_i(y)|$ to $|h_i'(y)|$.

[3/28/2017] On pages 401–402, there is an error in step 2 that affects all subsequent steps. Replace steps 2–6 with the following:

2. Determine the inverse transformation: express X and Y as functions of W and Z. With $Z = X/Y$ and $W = X$. The inverse transformation is $X = W$ and $Y = X/Z = W/Z$.

3. Calculate the Jacobian of the inverse transformation. The Jacobian is the determinant of the matrix of partial derivatives, or the determinant of

$$J = \begin{vmatrix} \frac{\partial x}{\partial z} & \frac{\partial x}{\partial w} \\ \frac{\partial y}{\partial z} & \frac{\partial y}{\partial w} \end{vmatrix}$$

In our example, the matrix of partial derivatives of X and Y with respect to Z and W, in that order, is

$$\begin{vmatrix} 0 & 1 \\ -\frac{w}{z^2} & \frac{1}{z} \end{vmatrix}$$

The determinant of a 2×2 matrix $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ is $ad - bc$. In our example, the Jacobian is

$$0 \cdot \frac{1}{z} - 1 \cdot \left(-\frac{w}{z^2}\right) = \frac{w}{z^2}$$

4. The joint density function of the transformed variables is
$$f_{Z,W}(z,w) = f_{X,Y}\big(h_1(z,w), h_2(z,w)\big)|J| \tag{29.1}$$
where $|J|$ is the absolute value of the Jacobian. In our case, $|J| = \left|\frac{w}{z^2}\right|$.
5. The domain of the variables must be transformed as well. Since we are interested in Z, the domain would be expressed as a range of z and a range of w as a function of z.

   In our example, with $Z = X/Y$, $W = X$, suppose $0 \le x \le y \le 1$. Then we would replace x and y with w and w/z respectively: $0 \le w \le w/z \le 1$. We see that $0 \le z \le \infty$. We also see that $0 \le w \le w/z$, implying only that $w \ge 0$, and $w/z \le 1$, implying $w \le z$. We conclude $0 \le z \le \infty$ and $0 \le w \le z$.
6. Integrate $f_{Z,W}(z,w)$ over w to obtain the marginal density function of Z. In our case, $f_Z(z) = \int_0^z f_{Z,W}(z,w)\mathrm{d}w$ for $z \ge 0$.

[10/15/2017] On page 427, in question 10, on the third line, replace $p(x)$ with $p(n)$.

[5/8/2017] On page 429, in question 22, on the last line of the question, replace $1/2a^3$ with $2/a^3$. None of the answer choices is correct.

[9/19/2017] On page 452, in question 14, multiply the five answer choices by 0.1:

(A) 197.8 (B) 203.9 (C) 207.0 (D) 213.1 (E) 217.2

[5/19/2017] On page 461, in question 23, on the second line, insert $1/2$ before $e^{-x/2}$.

[9/16/2017] On page 470, in the solution to question 13, 6 lines and 4 lines from the end (once apiece), change $100\theta(2+\theta)$ to $100(2+\theta)$; delete θ.

[7/20/2017] On page 478, in the solution to question 8, on the first line of the page, the first sum should be from $n = 2$, not $n = 1$.

[1/6/2017] On page 480, in the solution to question 16, change $\Phi(0.459) = \boxed{\mathbf{0.7057}}$ to $\Phi(0.459) = \boxed{\mathbf{0.6768}}$. None of the five answer choices is correct.

[5/8/2017] On page 481, replace the last line of the solution to question 22 with

$$= \frac{3}{7}\left(-\frac{1}{2^2} + \frac{1}{(2/3)^2} + \frac{4}{3}(2)\right) = \frac{3}{7}\left(\frac{14}{3}\right) = \boxed{\mathbf{2}}$$

[9/19/2017] On page 505, in the solution to question 6, on the line after "Set this equal to 2000", change $1000e^{0.25}$ to $1000^{0.25}u^{0.75}$.

[9/19/2017] On page 507, in the solution to question 14, replace the last three lines with

$$\begin{aligned}
\mathbf{E}\left[1000\max\left(0, \frac{5-T}{5}\right)\right] &= 1000\int_0^5 0.1\left(\frac{5-t}{5}\right)e^{-t/10}\mathrm{d}t \\
&= 1000\left(\frac{5-t}{5}(-e^{-t/10})\Big|_0^5 - 0.2\int_0^5 e^{-t/10}\,\mathrm{d}t\right) \\
&= 1000\left(1 - 2(1-e^{-0.5})\right) = \boxed{\mathbf{213.06}} \qquad \textbf{(D)}
\end{aligned}$$

[11/7/2017] On page 508, in the solution to question 20, on the fifth line, replace $\Pr(X > 0)$ with $\Pr(X = 0)$. On the seventh line, replace $\mathbf{E}[X^2]$ with $\mathbf{E}[X]^2$.

[9/27/2017] On page 515, replace the solution to question 11 with

We want the 60th percentile of correct answers to be 17.5, rather than 18, to take the continuity correction into account . The number of correct answers is binomial with parameters 30 and p. The mean is $30p$ and the variance is $30p(1-p)$. The 60th percentile of a standard normal distribution is 0.253.

$$\begin{aligned} 30p + 0.253\sqrt{30p(1-p)} &= 17.5 \\ 0.253\sqrt{30p(1-p)} &= 17.5 - 30p \\ 1.92027p - 1.92027p^2 &= 900p^2 - 1050p + 306.25 \\ 901.92p^2 - 1051.92p + 306.25 &= 0 \\ p &= \boxed{\mathbf{0.5604}}, 0.6059 \end{aligned}$$

0.6055 is spurious, since it works only with the negative square root of $30p(1-p)$. **(B)**

[5/22/2017] On page 521, in the solution to quesion 25, replace the last two lines with

$$\begin{aligned} &= \frac{1000}{900} e^{-900/\mu} \Big|_{1000}^{\infty} \\ &= \frac{10}{9}(1 - e^{-0.9}) = \boxed{\mathbf{0.6594}} \end{aligned}$$