Errata for the SOLUTIONS MANUAL for the textbook "Probability and Statistics – The Science of Uncertainty", Second Edition, by M.J. Evans and J.S. Rosenthal. As of Fall 2024.

(These errata will be added to the online version later.)

• Problem 1.4.18: We should also allow the possibility of both hands having ZERO spades, i.e. the sum should go from $i = 0$ not $i = 1$.

• Challenge 1.5.16: The beginning of the solution is correct, but then $\sum_{i=1}^{6} q_{12-i}$ does not equal $\sum_{j=7}^{12} q_j$, it equals $\sum_{j=6}^{11} q_j$, so that the "6+5+4+3+2+1" there should be "5+6+5+4+3+2" (and similarly in the fractions out of 36 just before), which equals 25 instead of 21, giving an answer 5/25 not 5/21.

• Problem 2.2.9: "$w \in \{0, 1, ..99\} \cap \{0, 11, 22, 33, \ldots, 99\}$" should be "$w \in \{0, 1, ..99\} \setminus \{0, 11, 22, 33, \ldots, 99\}$", i.e. setminus instead of intersection.

• Exercise 2.3.15(b): $(0.65)^{10}$ should be $(0.65)^9$, since there are just 9 misses before the first score.

• Exercise 2.3.16(c): $\binom{15}{4}$ should be $\binom{14}{4}$, since the 15th draw has to be black.

• Exercise 2.5.8: In part (a), $F_Y(3/4) = 1$ not $1 - (3/4)^3$, and $F_Y(1/3) = (1/3)^3$, so the answer should be $1 - (1/3)^3 = 26/27$. And, in part (c), $F_Y(1/2) = 1$ not $1 - (1/2)^3$, so the answer should be $1 - (1/2)^3 = 7/8$.

• Exercise 2.5.15(a): $e^{-4/5}$ should be $e^{-(4/5)^2}$ (twice).

• Exercise 2.5.15(f): Actually here $\mathbf{P}(Z{=}1/2) = (1/3)\,\mathbf{P}(X{=}1/2) = 0$ since, as mentioned at the start of the solution, $\mathbf{P}(X = z) > 0$ only if $z \in \{0, 2/5, 4/5\}$.

• Exercise 2.6.12: In the final equation, "$(y^3)^{-2/3}$" should be "$(y^3)^{-2/3}/3$", leading to a final answer of $3y^{-4}$ instead of y^{-4}.

• Exercise 2.7.8(d): For the case where $-2 < x < 1$ and $y \geq 4$, $\int_{-2}^{x} \frac{u^2+2}{4}\,du$ should be $\int_{-2}^{x} \frac{u^2+2}{9}\,du$, and the following denominators should be 9 and 27 instead of 4 and 12.

• Exercise 2.7.15(c): The incorrect joint density was used. The correct solution is:
To compute $f_X(x) = \int_x^1 Cye^{-xy}dy$, use integration by parts with $u = y$ and $dv = e^{-xy}\,dy$, $u = y, dv = e^{-xy}\,dy, du = dy, v = -\frac{1}{x}e^{-xy}$ We have

$$\begin{aligned} f_X(x) &= \int_x^1 Cye^{-xy}\,dy = C\left(-\frac{y}{x}e^{-xy}\right)\Big|_x^1 + C\int_x^1 \frac{1}{x}e^{-xy}\,dy \\ &= -\frac{C}{x}e^{-x} + Ce^{-x^2} + \frac{C}{x^2}\left(e^{-x^2} - e^{-x}\right) \end{aligned}$$

$$= C\left(\frac{e^{-x^2}}{x^2} - \frac{e^{-x}}{x^2} - \frac{e^{-x}}{x} + e^{-x^2}\right).$$

And, for $f_Y(y) = \int_0^y Cye^{-xy}dx$, we have

$$f_Y(y) = \int_0^y Cye^{-xy}\,dx = Cy\int_0^y e^{-xy}\,dx = Cy\left[-\frac{e^{-xy}}{y}\right]_0^y = Cy\left(-\frac{e^{-y^2}}{y} + \frac{1}{y}\right) = C(1-e^{-y^2}).$$

- Exercise 2.8.7(d): The reason $f_{Y|X}(y|x) = f_Y(y)$ for all x and y is because $C = 9/1024000000$, as shown in Exercise 2.7.4(d).

- Exercise 2.8.14: In the first line, $f_X(x) = (x^2+2)/4$ should be $f_X(x) = (x^2+2)/9$ (but the computation is correct after that).

- Exercise 3.1.3(a): The initial sum is correct, but that sum is then equal to -1, not to $-173/12$ nor -14.4.

- Exercise 3.2.5: $\mathbf{E}(6Y)$ is mistakenly computed as $3\,\mathbf{E}(Y)$ which should be $6\,\mathbf{E}(Y)$. The correct solution is:

$$\mathbf{E}(-5X-6Y) = -5\mathbf{E}(X) - 6\mathbf{E}(Y) = -5((7+3)/2) - 6(1/9) = -77/3.$$

- Exercise 3.3.11: Actually X and Y are not independent, so the solution is incorrect. The correct solution is:

We know $\mathbf{P}(X = x) = 1/6$ for $x = 1, 2, ..., 6$. Therefore $\mathbf{E}(X) = (1)(1/6) + (2)(1/6) + ... + (6)(1/6) = 7/2$. Let Z be the number showing on the second die. Notice that X and Z are independent and have the same probabilities. Here we have $Y = X + Z$. Therefore $\mathbf{E}(Y) = \mathbf{E}(X+Z) = \mathbf{E}(X) + \mathbf{E}(Z) = 2\mathbf{E}(X) = 7$. Similarly, $\mathbf{E}(XY) = \mathbf{E}(X(X+Z)) = \mathbf{E}(X^2 + XZ) = \mathbf{E}(X^2) + \mathbf{E}(X)\mathbf{E}(Z) = \mathbf{E}(X^2) + \mathbf{E}(X)^2 = \frac{1}{6}(1^2+2^2+3^2+4^2+5^2+6^2) + \left(\frac{7}{2}\right)^2$. For covariance, we have $\mathbf{Cov}(X,Y) = \mathbf{Cov}(X, X+Z) = \mathbf{Cov}(X,X) + \mathbf{Cov}(X,Z) = \mathbf{E}(X^2) - \mathbf{E}(X)^2 + (\mathbf{E}(XZ) - \mathbf{E}(X)\mathbf{E}(Z))$. Due to independence of X and Z, we have $\mathbf{E}(XZ) = \mathbf{E}(X)\mathbf{E}(Z)$ so we have $\mathbf{Cov}(X,Y) = \frac{1}{6}(1^2+2^2+3^2+4^2+5^2+6^2) - \left(\frac{7}{2}\right)^2 = 35/12$.

- Exercise 4.2.5: For consistency, the final "≤ 0.001" should be "< 0.001".

- Exercise 4.2.11: In the last two lines, "$5Y_n/n + 4Z_n/n$" should be "$4Y_n/n + 5Z_n/n$" (and then carried over to the $\mathbf{E}(X_n/n)$ and $\mathbf{Var}(X_n/n)$ calculations). And, in the middle of the last line, "$\mathbf{Var}(Z_n)/n$" should be "$\mathbf{Var}(Z_n)/n^2$".

- Exercise 4.2.23: In solutions line 4, "$\frac{1}{4}$" should be "$\frac{1}{2}$" (twice).

- Exercise 4.3.10: In solutions line 1, "$Y_3 = 0 = Y_5 = Y_6$" should be "$Y_3 = Y_4 = 0 = Y_6$".

- Exercise 4.3.11(a): In both the text and solution, this event should be specified as only "with probability 1".