Errata and updates for ASM Exam P Manual (Fourth Edition) sorted by date

[2/11/2022] On page xix, two lines after the second displayed line, change "sum of difference" to "sum or difference".

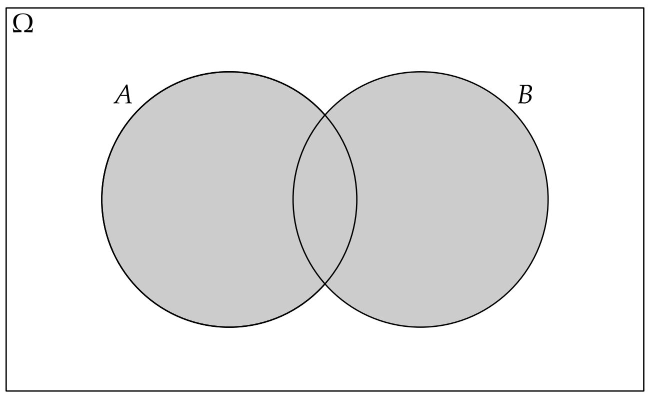
[2/11/2022] On page 22, in the sidebar, replace the last sentence with

The sum approaches $1 - 1/e$ as $n \to \infty$. So the probability that none of n get their own hat converges to $1/e$ as $n \to \infty$.

[2/11/2022] On page 267, in exercise 21.17 choice A, change the expression for $y = 1, 2, 3, \ldots$ to $\dfrac{0.1^{y+1}}{(y+1)!}e^{-0.1}$.

[2/11/2022] On page 369, in exercise 29.13 choice (E), change $e^{(-0.1y)^{1.25}}$ to $e^{-(0.1y)^{1.25}}$.x

[11/26/2021] On page 2, in the printed version of the manual only, Figure 1.1 is incorrect. Replace it with



The figure is correct in the online version.

[8/5/2021] On page 229, replace the solution to exercise 18.2 with

There is a 1/5 probability that a 5 appears on the first roll, given that 6 did not appear on the first roll. If a 5 is not obtained on the first roll, we must wait until after two rolls, since the second roll is 6. At any point of time, the expected number of rolls until the next 5 is six, as discussed below. So after 2 rolls, the expected roll on which 5 will appear is $2 + 6 = 8$. There is a 4/5 probability that 5 does not appear on the first 2 rolls.

By the double expectation formula, the expected number of rolls is

$$\mathbf{E}[X \mid Y = 2] = \Pr(X = 1 \mid Y = 2)(1) + \Pr(X \geq 3 \mid Y = 2)(8) = 0.2(1) + 0.8(8) = \boxed{\mathbf{6.6}} \qquad \textbf{(D)}$$

One way to show that the expected number of rolls until a specific number appears is 6 is as follows. Let N be the expected number of rolls that we want. By definition of expected value

$$\begin{aligned}\mathbf{E}[N] &= \sum_{n=1}^{\infty} n \Pr(N = n)\\ &= \sum_{n=1}^{\infty} n \left(\frac{5}{6}\right)^{n-1}\left(\frac{1}{6}\right) = \frac{1}{6}\sum_{n=1}^{\infty} n\left(\frac{5}{6}\right)^{n-1}\end{aligned}$$

The sum can be evaluated as a geometric sum of geometric series:

$$\begin{aligned}
\sum_{n=1}^{\infty} n\left(\frac{5}{6}\right)^{n-1} &= \sum_{m=1}^{\infty}\sum_{n=m}^{\infty}\left(\frac{5}{6}\right)^{n-1} \\
&= \sum_{m=1}^{\infty}\frac{(5/6)^{m-1}}{1-5/6} \\
&= 6\left(\frac{1}{1-5/6}\right) = 36
\end{aligned}$$

So $\mathbf{E}[N] = \frac{1}{6}(36) = 6$.