Solutions to Supplementary Practice for Quiz 2

Math 125 (Introductory Statistics) *Kovitz* Spring 2025

1. True. Without replacement, the ticket with the number two cannot be drawn more than once.

   Drawing the ticket with the two on each of the four draws are mutually exclusive outocmes. (Top box on page 241.)

   So apply the addition rule in the lower box on page 241.

   Answer: True.

2. False. With replacement, the ticket with the number two can be drawn more than once.

   Drawing the ticket with the two on each of the four draws are not mutually exclusive outcomes. (Top box on page 241.)

   So, the box on page 242 applies, and the chance of at least one is not the sum of the inidivdual chances.

   Answer: False.

3. False. The number two can be rolled more than once.

   Result of two spots on each of the five rolls are not mutually exclusive outcomes. (Top box on page 241.)

   Answer: False.

4. Do not add the chances. See the result of problem 3.

   See the box on page 250.

   The opposite event is that he gets no three spots.

   The chance of not getting a three spot is 5/6 and the rolls are independent.

   P(no 3's) = P(1st non-3 and 2nd non-3 ...) =
   P(non-3) × P(non-3) ... = [P(non-3)]^4 = $\left(\frac{5}{6}\right)^4 \approx 48\%$.

   The chance of "at least one" is the opposite, so: 100% − 48% = 52$, answer E.

5. C, 38.6%

   There are only two different results for each guess—3 or non-3, the outcomes are independent, and the chances are the same on each roll. The binomial formula may be used.

   $n = 4$, $k = 1$, $n - k = 3$, $p = 1/6$, and $1 - p = 5/6$.

   The formula gives

   $\frac{4!}{1!3!}(1/6)^1(5/6)^3 = \frac{24}{1\times 6}(0.16667)(0.5787) = 4(0.1667)(0.5787) = \approx .386 = 38.6\%$,

   answer C.

   (An exact answer of 500/1296 = 125/324 is also correct. Convert it to an approximate decimal to choose the correct letter.)

6. There are only two different results for each toss–a three or a non-three, the tosses are independent, and the chance are the same on each roll. The binomial formula applies in this case.

   $n = 4$, $k = 2$, $n - k = 2$, $p = 1/6$, and $1 - p = 5/6$.

   The formula gives

$$\frac{4!}{2!2!}(1/6)^2(5/6)^2 = \frac{24}{2\times 2} = 6(1/36)(25/36) = 150/1296 = 25/216 \approx 0.11574 \approx 11.574\%.$$

   The answer is: (C) 25/216 or about 11.574%.