# Solutions to Practice for Quiz 2

Math 125 (Introductory Statistics) *Kovitz* Spring 2025

1. (a) (D) 52%

Do not add up four chances of getting the 3 spot. The outcomes are not mutually exclusive; he could get the 3 spot more than once. (See the box on page 242 in the text.)

Instead look to the opposite outcome. The opposite of getting at least one 3 spot is not getting any 3 spots in the four rolls. That outcome is "he got a non-3 spot on all four rolls."

Since the results are independent, just multiply together four factors, each of them the unconditional chance of not getting a 3 spot (5/6). (See the box on page 232 in the text.)

We have just found the chance of the opposite of "at least one of the four rolls show the 3 spot" to be equal to $(5/6)^4 \approx 0.48 = 48\%$. (Now refer to the second box on page 223 of the text.)

The chance originally requested (of getting at least on question correct) is

$$100\% - 48\% = 52\%.$$

Answer: (D) 52%

(b) (C) 38.6%

This is a binomial probability. The clue is the word "exactly" in the question. Find $n$, $k$, and $p$.

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

This is getting the 3 spot on one roll, so $k = 1$ and $p = 1/6$, the chance of guessing correctly on each question.

The binomial formula is: The probability $= \frac{n!}{k! \times (n-k)!} p^k (1-p)^{n-k}$. (page 259)

$\frac{4!}{1! \times 3!}(1/6)^1(5/6)^3 = \frac{24}{1 \times 6}(0.16667)(0.5787) = 4 \times .1667 \times .5787 \approx 0.386 = 38.6\%$.

Answer: (C) 38.6%

(c) (C) 11.57%

This is a binomial probability. The clue is the word "exactly" in the question. Find $n$, $k$, and $p$.

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

This is getting the 3 spot on exactly two rolls, so $k = 2$ and $p = 1/6$, the chance of guessing correctly on each question.

The binomial formula is: The probability $= \frac{n!}{k! \times (n-k)!} p^k (1-p)^{n-k}$. (page 259)

$\frac{4!}{2! \times 2!}(1/6)^2(5/6)^2 = \frac{24}{2 \times 2}(0.02778)(0.69444) = 6 \times .02778 \times .694 \approx 0.1157 = 11.57\%$.

Answer: (C) 11.57%

2. (a) (D) 73.8%

Do not add up six chances of guessing correctly. The outcomes are not mutually exclusive; he could guess correctly more than once. (See the box on page 242 in the text.)

Instead look to the opposite outcome. The opposite of guessing correctly at least once is not guessing correctly even once in the six questions. That outcome is "he guessed incorrectly on all six tries."

Since the results are independent, just multiply together six factors, each of them the unconditional chance of guessing wrong ($4/5 = 0.8$). (See the box on page 232 in the text.)

We have just found the chance of the opposite of "at least one of the six gueses is correct" to be equal to $(0.8)^6 \approx 0.262 = 26.2\%$. (Now refer to the second box on page 223 of the text.)

The chance originally requested (of getting at least on question correct) is

$$100\% - 26.2\% = 73.8\%.$$

Answer: (D) 73.8%

(b) (C) 39.3%

This is a binomial probability. The clue is the word "exactly" in the question. Find $n$, $k$, and $p$.

$n = 6$, $k = 1$, $n - k = 5$, $p = 0.2$, and $1 - p = 0.8$.

This is getting one question correct, so $k = 1$ and $p = 0.2$, the chance of guessing correctly on each question.

The binomial formula is: The probability $= \frac{n!}{k! \times (n-k)!} p^k (1-p)^{n-k}$. (page 259)

Here $\frac{6!}{1! \times 5!}(0.2)^1(0.8)^5 = \frac{720}{1 \times 120}(0.2)(0.32768) \approx 0.393 = 39.3\%$.

Answer: (C) 39.3%

3. (a) (D) 86.65%

Do not add up seven chances of drawing a heart. The outcomes are not mutually exclusive; he could draw a heart more than once. (See the box on page 242 in the text.)

Instead look to the opposite outcome. The opposite of drawing a heart at least once is not drawing a heart even once in the seven draws. That outcome is "he chose a non-heart on all seven draws."

Since the results are independent, just multiply together seven factors, each of them the unconditional chance of drawing a non-heart ($39/52 = 0.75$). (See the box on page 232 in the text.)

We have just found the chance of the opposite of "at least one of the seven cards drawn is a heart" to be equal to $(0.75)^7 \approx 0.1335 = 13.35\%$. (Now refer to the second box on page 223 of the text.)

The chance originally requested (of getting at least one heart) is

$$100\% - 13.35\% = 86.65\%.$$

Answer: (D) 86.65%

(b) (C) 31.15%

This is a binomial probability. The clue is the word "exactly" in the question. Find $n$, $k$, and $p$.

$n = 7$, $k = 1$, $n - k = 6$, $p = 0.25$, and $1 - p = 0.75$.

This is getting one question correct, so $k = 1$ and $p = 0.25$, the chance of guessing correctly on each question.

The binomial formula is: The probability $= \frac{n!}{k! \times (n-k)!} p^k (1-p)^{n-k}$. (page 259)

Here $\frac{7!}{1! \times 6!}(0.25)^1(0.75)^5 = \frac{5040}{1 \times 720}(0.25)(0.1779785) \approx 0.3115 = 31.15\%$.

Answer: (C) 31.15%

4. (a) (D) 92%

Do not add up five chances of drawing a $\boxed{2}$. The outcomes are not mutually exclusive; he could draw a $\boxed{2}$ more than once.
(See the box on page 242 in the text.)

Instead look to the opposite outcome. The opposite of drawing a $\boxed{2}$ at least once is not drawing a $\boxed{2}$ even once in the five draws. That outcome is "he chose a non-$\boxed{2}$ $\left(\text{a } \boxed{1} \text{ or a } \boxed{3}\right)$ on all five draws."

Since the results are independent, just multiply together five factors, each of them representing the unconditional chance of drawing a ticket that is not a $\boxed{2}$ $(3/5 = 0.60)$.
(See the box on page 232 in the text.)

We have just found the chance of the opposite of "a $\boxed{2}$ is drawn at least once" to be equal to $(0.6)^5 = 0.07776 \approx 8\%$. (Now refer to the second box on page 223 of the text.)

The chance originally requested (of getting at least one heart) is
$100\% - 8\% = 92\%$.

Answer: (D) 92%

(b) (C) 26%

This is a binomial probability. The clue is the word "exactly" in the question. Find $n$, $k$, and $p$.

$n = 5$, $k = 1$, $n - k = 4$, $p = 0.40$, and $1 - p = 0.60$.

This is drawing one $\boxed{2}$, so $k = 1$ and $p = 0.40$, the chance of drawing a ticket with a $\boxed{2}$.

The binomial formula is: The probability $= \frac{n!}{k! \times (n-k)!} p^k (1-p)^{n-k}$. (page 259)

Here $\frac{5!}{1! \times 4!}(0.40)^1(0.60)^4 = \frac{120}{1 \times 24}(0.40)(0.1296) = 0.2592 \approx 26\%$.

Answer: (C) 26%

(c) (D) 34.56%

This is a binomial probability. The clue is the word "exactly" in the question. Find $n$, $k$, and $p$.

$n = 5$, $k = 2$, $n - k = 3$, $p = 0.40$, and $1 - p = 0.60$.

This is drawing two $\boxed{2}$'s, so $k = 2$ and $p = 0.40$, the chance of drawing a ticket with a $\boxed{2}$.

The binomial formula is: The probability $= \frac{n!}{k! \times (n-k)!} p^k (1-p)^{n-k}$. (page 259)

Here $\frac{5!}{2! \times 3!}(0.40)^2(0.60)^3 = \frac{120}{2 \times 6}(0.16)(0.216) = 0.3456 = 34.56\%$.

Answer: (D) 34.56%