

Information

The first **five** questions (**1** to **5**) refer to the following:

Winnipeg has three professional sports teams – the Winnipeg Jets hockey team, the Winnipeg Blue Bombers football team and the Winnipeg Goldeyes baseball team. Suppose we have the following information about Winnipeg residents:

- 55% are Jets fans
- 40% are Bombers fans
- 64% are Jets fans or Goldeyes fans
- 50% are Bombers fans or Goldeyes fans
- 27% are Jets fans and Bombers fans
- 11% are Jets fans and Goldeyes fans
- 6% are fans of all three teams

We will randomly select one Winnipeg resident.

Let J denote the event that the person is a Jets fan, let B denote the event that the person is a Bombers fan, and let G denote the event that the person is a Goldeyes fan.

Probabilities are numbers between 0 and 1, so your answers to the below questions should be decimals, not percentages.

Enter only a numerical answer (**do not** show any work).

Question 1 (1 point)

What is the probability that that the selected person is a Jets fan or a Bombers fan?

Question 2 (1 point)

What is the probability that the selected person is a Goldeyes fan?

Question 3 (1 point)

Using the given information and your answer to Question 2, what is the probability that the selected person is a Bombers fan and a Goldeyes fan?

Question 4 (1 point)

Using the given information and your answers to the previous questions, what is the probability that the selected person is not a fan of any of the three teams?

Question 5 (1 point)

Which of the following pairs of events are independent of each other?

Question 5 options:

- J and B
- J and G
- B and G
- All of the above
- None of the above

Question 6 (5 points)

An unfair coin is tossed two times. For each toss, the probability that the coin comes up heads is 0.7 and the probability that the coin comes up tails is 0.3. Let X be the number of coin tosses that come up heads. Find the probability distribution of X using 2 methods.

(a) Method One: What are the possible values X can take? Write out the sample space to see the list of possible outcomes from the two coin tosses and obtain the probability of each of the outcomes in the sample space. How are the possible values of X related to each of the possible outcomes in the sample space? Finally, write out the probability distribution of X .

(b) Method Two: The binomial setting is satisfied in this problem. Explain how all four requirements of the binomial setting are satisfied in the context of this problem. Use the binomial formula for each possible value of X to obtain the probability distribution of X .

Question 7 (2 points)

Some variable of interest follows a **(normal/right-skewed)** distribution with a mean of 100 and a standard deviation of 10. In a random sample of size **(5/50)**, what is the probability that the sample mean is between 95 and 120?

In which of the following situations (select more than one if needed) is it possible to calculate the probability, and if it is possible to calculate the probability, would the calculated probability be **exact** or **approximate**?

(You do not need to actually calculate the probability.)

Question 7 options:

- A) normal, 5, and exact
- B) normal, 5, and approximate
- C) normal, 50, and exact
- D) normal, 50, and approximate
- E) right-skewed, 5, and exact
- F) right-skewed, 5, and approximate
- G) right-skewed, 50, and exact
- H) right-skewed, 50, and approximate

Information

The next **two** questions (**8** and **9**) refer to the following:

The weight of adobe bricks used for construction is normally distributed with a mean of 5 pounds and a standard deviation of 0.3 pounds

Question 8 (1 point)

What is the probability that a random sample of 50 bricks has a mean weight between 4.97 and 5.04 pounds?

Enter only a numerical answer (**do not** show any work). Keep 4 decimal places in intermediate calculations and report your final answer to 4 decimal places.

Question 9 (1 point)

What is the probability that a random sample of 100 bricks has a total weight equal to 495 pounds?

Enter only a numerical answer (**do not** show any work). Keep 4 decimal places in intermediate calculations and report your final answer to 4 decimal places.

Information

The next **three** questions (**10 to 12**) refer to the following:

The weight of bags of organic fertilizer is normally distributed with a mean of 10 pounds and a standard deviation of 0.5 pounds.

Question 10 (1 point)

What is the probability that a random sample of 38 bags of organic fertilizer has a mean weight less than 9.9 pounds?

Enter only a numerical answer (**do not** show any work). Keep 4 decimal places in intermediate calculations and report your final answer to 4 decimal places.

Question 11 (1 point)

What is the probability that a random sample of 46 bags of organic fertilizer has a total weight greater than 450.8 pounds?

Enter only a numerical answer (**do not** show any work). Keep 4 decimal places in intermediate calculations and report your final answer to 4 decimal places.

Question 12 (1 point)

If we take a random sample of 100 bags of organic fertilizer, there is a 13% chance that their mean weight will be less than what value?

Enter only a numerical answer (**do not** show any work). Keep 4 decimal places in intermediate calculations and report your final answer to 2 decimal places.

Question 13 (1 point)

Weights of Caramilk chocolate bars follow a normal distribution with mean 50 grams and standard deviation 0.8 grams. The chocolate bars are sold in packages of four. There is an approximate 99.7% chance that the mean weight of the four bars in a package is between:

Question 13 options:

- A) 48.6 grams and 51.4 grams
- B) 49.2 grams and 50.8 grams
- C) 48.8 grams and 51.2 grams
- D) 48.4 grams and 51.6 grams
- E) 47.6 grams and 52.4 grams

Information

The next **two** questions (**14** and **15**) refer to the following:

Suppose that 8% of all Canadians are left-handed.

Question 14 (1 point)

If we randomly select 200 Canadians, what is the approximate probability that less than 5% of them are left-handed?

Enter only a numerical answer (**do not** show any work). Keep **6 decimal places** in intermediate calculations and report your final answer to 4 decimal places.

Question 15 (1 point)

If we randomly select 200 Canadians, what is the approximate probability that more than 18 of them are left-handed?

Enter only a numerical answer (**do not** show any work). Keep **6 decimal places** in intermediate calculations and report your final answer to 4 decimal places.