Information

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

Suppose we have the following facts about a fast food restaurant:

- 49% of customers buy a hamburger
- 62% of customers buy french fries
- 70% of customers buy a hamburger or a Coke
- 78% of customers buy french fries or a Coke
- 27% of customers buy a hamburger and french fries
- 21% of customers buy a hamburger and a Coke
- 17% of customers buy all three items

We will randomly select one customer. Let H be the event that the customer buys a hamburger, let F be the event that the customer buys french fries, and let C be the event that the customer buys a Coke.

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

Question 1 (1 point)

What is the probability that the selected customer buys a hamburger or french fries?

Your Answer:

Question 2 (1 point)

What is the probability that the selected customer buys a Coke?

Your Answer:

Question 3 (1 point)

What is the probability that the selected customer buys french fries and a Coke?

Hint: use the given information and your answer to Question 2.

Your Answer:

Question 4 (1 point)

What is the probability that the selected customer doesn't buy any of the three items?

Hint: use the given information and your answers to the previous questions.

Your Answer:

Question 5 (1 point)

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

Question 5 options:

- H and F
- H and C
- F and C
- All of the above
- None of the above

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The next four questions (**6** to **9**) refer to the following:

An unfair coin is tossed three times. For each toss, the probability that the coin comes up heads is 0.6 and the probability that the coin comes up tails is 0.4.

If we let *X* be the number of coin tosses that come up heads, observe that the possible values of *X* are 0, 1, 2, and 3. Find the probability distribution of *X*.

Hint: the problem can be solved in two different ways as described below. Both methods will result in the same answer.

Method 1: Write out the sample space of possible outcomes, obtain the probability of each of the outcomes, and relate each of these outcomes to X = 0, X = 1, X = 2, or X = 3.

Method 2: Verify that the four requirements of the binomial setting are satisfied in this problem. Use the binomial formula for each possible value of *X* to obtain the probability distribution of X.

(If you only know how to solve the problem with one method, please be sure to check the assignment solutions after the due date to understand the other method.)

Question 6 (0.5 points)

What is P(X = 0)?

Your Answer:

Question 7 (0.5 points)

What is P(X = 1)?

Your Answer:

Question 8 (0.5 points)

What is P(X = 2)?

Your Answer:

Question 9 (0.5 points)

What is P(X = 3)?

Your Answer:

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In the next set of questions (**10** to **21**), you will consider a situation and a variable *X* and determine whether each of the four requirements of the binomial setting are met.

For questions **10** to **13**:
Take a random sample of 25 Canadians.
X = number of people in the sample with blood type A.

Question 10 (0.25 points)

There are a fixed number of trials, *n*.

Question 10 options:

- True
- False

Question 11 (0.25 points)

Each trial can be categorized as being either a success or a failure (two outcomes), and *X* counts the number of successes.

Question 11 options:

- True
- False

Question 12 (0.25 points)

The probability of success *p* stays the same from trial to trial.

Question 12 options:

- True
- False

Question 13 (0.25 points)

Trials are independent of each other (that is, success or failure on one trial doesn't affect the probability of success or failure on any other trial).

Question 13 options:

- True
- False

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For questions **14** to **17**:
There are ten people waiting in line at a bank.
X = number of people in line who are served in the next 15 minutes.

Question 14 (0.25 points)

There are a fixed number of trials, n.

Question 14 options:

- True
- False

Question 15 (0.25 points)

Each trial can be categorized as being either a success or a failure (two outcomes), and X counts the number of successes.

Question 15 options:

- True
- False

Question 16 (0.25 points)

The probability of success p stays the same from trial to trial.

Question 16 options:

- True
- False

Question 17 (0.25 points)

Trials are independent of each other (that is, success or failure on one trial doesn't affect the probability of success or failure on any other trial).

Question 17 options:

- True
- False

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For questions **18** to **21**:
GPAs at a large university follow a normal distribution with mean 3.00 and standard deviation 0.50. You take a random sample of 20 students.
X = number of students in the sample with GPAs over 4.00.

Question 18 (0.25 points)

There are a fixed number of trials, n.

Question 18 options:

- True
- False

Question 19 (0.25 points)

Each trial can be categorized as being either a success or a failure (two outcomes), and X counts the number of successes.

Question 19 options:

- True
- False

Question 20 (0.25 points)

The probability of success p stays the same from trial to trial.

Question 20 options:

- True
- False

Question 21 (0.25 points)

Trials are independent of each other (that is, success or failure on one trial doesn't affect the probability of success or failure on any other trial).

Question 21 options:

- True
- False

Question 22 (1 point)

A student must pass through two sets of traffic lights on his way to work. The first light is red 40% of the time, yellow 10% of the time and green 50% of the time. The second light is red 60% of the time, yellow 5% of the time and green 35% of the time. Assuming that the lights operate independently, what is the probability that the student has to stop exactly one time on his way to work? (He will stop only for a red light, and not if it is yellow.)

Question 22 options:

- A) 0.46
- B) 0.48
- C) 0.50
- D) 0.52
- E) 0.54

Question 23 (1 point)

You flip an unfair coin two times. The probability that you get heads both times is 0.36. What is the probability that you get tails both times?

Question 23 options:

- A) 0.16
- B) 0.25
- C) 0.36
- D) 0.64
- E) 0.40

Question 24 (1 point)

It is known that 53% of students at a large university are female. If we take a random sample of 12 students at the university, what is the probability that exactly seven of them are female?

Question 24 options:

- A) 0.1734
- B) 0.1834
- C) 0.1934
- D) 0.2034
- E) 0.2134