ECE Statistics
Cumulative Review #1

1. In 2019, Mr. X's ECE Stats classes had 57 students on the roster. In 2024, there were 73 students on the roster. Calculate the percentage change from 2019 to 2024.

a) 2.8% increase
b) 23% increase
c) 28% increase
d) 45% increase

2. Consider a data set that has a mean of 9.45 and a median of 9.8. Which of the following would best describe the shape of the dotplot of the data?

a) Since the mean is less than the median, the dotplot would be skewed to the left.
b) Since the mean and median are proportionally close, the dotplot would be approximately symmetrical.
c) Since the mean is less than the median, the dotplot would be skewed to the right.
d) No assumptions about shape can be made without standard deviation or quartiles.

3. The same data set from above has a mean of 9.45 and a standard deviation of 1.7. Which of the following values would be an outlier?

a) 6.3
b) 8.3
c) 10.3
d) 13.1

4. Given the same data from Question #3, what would be the z-score of a data point at 10?

a) -0.32
b) 0.32
c) 0.77
d) 4.44

5. A data set has the following five number summary: {3, 6, 8.5, 10, 15}. From this, what are the lower and upper outlier fences (respectively)?

a) 0 and 16
b) 2.5 and 14.5
c) -2 and 18
d) 2 and 14

6. Rick wants to perform an experiment to see if listening to Mozart for 15 minutes prior to taking a test causes an increase in achievement on the test (the so-called *Mozart Effect*). He gets 30 students at his school to volunteer for the experiment, and they were randomly assigned to one of two groups: one group had Mozart playing in the background, and the other had silence. Both groups were allowed 15 minutes to study prior to the test. If he does see a significant difference, which of the following best describes the strength of the result?

a) Because of the random assignment, Rick can say that listening to Mozart causes higher achievement for everyone.
b) Because the sample consisted of randomly assigned students from his school, Rick can say that Mozart causes higher achievement for the students at his school.
c) Because the sample contained randomly assigned volunteers, Rick can say that Mozart causes higher achievement for the students that participated in the study.
d) Without random selection of subjects, Rick cannot say that Mozart causes higher achievement.

7. Consider a data set that, when placed on a scatter plot, has a correlation of $r = -0.38$. Which of the following best describes the trend?

a) There is a strong negative trend.
b) There is a moderate negative trend.
c) There is a weak negative trend.
d) There is very little to no trend.
e) There is a weak positive trend.

8. According to a recent poll, 41% of households in the US leave out cookies for Santa Claus, and 29% of households collect teeth for the Tooth Fairy. 23% of households in the US do both. What percentage do neither activity?

a) 77%
b) 53%
c) 30%
d) 7%

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Info for questions 9-12: Consider a marble jar that contains 11 blue marbles, 8 red marbles, 4 silver marbles, and one gold marble.

9. If three marbles are pulled at random from the jar without replacement, what is the probability that all three are blue?

a) 7.16%
b) 8.15%
c) 9.62%
d) 10.96%

10. Lydia reaches into the jar and realizes that the marbles feel different – based on feel, she pulls out a marble that is a shiny metallic color. What is the probability that it is gold?

a) 20%
b) 80%
c) 4.2%
d) 17%

11. The balls in the jar have a value – blue ones are worth 2 points, red ones are worth 3 points, silver ones are worth 7 points, and the gold marble is worth 20 points. If a marble is drawn at random, what is its expected point value?

a) 1.33 points
b) 2 points
c) 3.92 points
d) 4 points

12. This marble jar is placed on a table at a local event, and people are encouraged to draw a marble. If they draw the gold marble, they win a Starbucks gift card. All marbles are replaced after each draw. Over the course of the event, 35 people participate. What is the probability that the organizers hand out more than three gift cards?

a) 17.78%
b) 12.5%
c) 8.57%
d) 5.65%