

For each question, mark the best answer on your answer sheet.  
For all questions, NOTA means "None of these answers."

For questions 1 - 2: Ms. Woolfenden's 12 students took their exam. The average score was 80 with a standard deviation of 5.

1. If Nerissa earned a 72 and Dan earned a 78, what is the average score of the remaining students?  
A) 80      B) 81      C) 82      D) 88      E) NOTA
  
2. Ms. Woolfenden realizes that one of the questions was not valid. She decides to add 5 points to each of the 12 exam scores. What is the new average and standard deviation?  
A) 80 & 5      B) 80 & 10      C) 85 & 5      D) 85 & 10      E) NOTA
  
3. If it is known that the median of a distribution is much less than the mean of the distribution, what can be said of the shape of the distribution?  
A) It is skewed right.      B) It is skewed left.      C) It is roughly symmetric.  
D) It is uniform.      E) NOTA
  
4. When comparing the t-distribution to the standard normal distribution, which of the following is **NOT** true?  
A) Both distributions are symmetric about zero.  
B) Both distributions are bell-shaped.  
C) As the degrees of freedom increase, the t distribution approaches the standard normal curve ever more closely.  
D) t distributions have less probability in the tails.  
E) NOTA  
F)
  
5. If A and B are independent events with  $P(A) = 0.2$  and  $P(B) = 0.3$ , find the probability that A or B occur.  
A) 0.06      B) 0.44      C) 0.50      D) 0.56      E) NOTA
  
6. Which of the following will **NOT** decrease the probability of a Type II error?  
A) Increasing the level of significance.  
B) Increasing the sample size.  
C) Increasing the standard deviation.  
D) Increasing the difference between the null value and the alternative value.  
E) NOTA

For questions 7 - 9: A pizza company claims that their mean delivery time is 30 minutes with a standard deviation of 6 minutes. Believing the average delivery takes longer, a consumer advocate conducts a random sample of 9 deliveries that yields a mean delivery time of 32.8 minutes per delivery. Using a significance level of 5%, the advocate tests the company's claim.

7. What are the appropriate hypotheses for this test?

- A)  $H_0: \mu = 30, H_a: \mu > 32.8$       B)  $H_0: \mu = 32.8, H_a: \mu < 32.8$   
 C)  $H_0: \mu = 32.8, H_a: \mu > 32.8$       D)  $H_0: \mu = 30, H_a: \mu > 30$       E) NOTA

8. What is the probability of a Type I error?

- A) 0.028      B) 0.03      C) 0.05      D) 0.95      E) NOTA

9. If the P-value is .08, we can conclude that

- A) There is sufficient evidence that the company's mean delivery time is more than 30 minutes.  
 B) There is sufficient evidence that the company's claim is true.  
 C) There is insufficient evidence that the company's mean delivery time is more than 30 minutes.  
 D) There is insufficient evidence that the company's claim is true.  
 E) NOTA

10. Which of the following can establish a causal link between two variables?

- A) A controlled experiment      B) A sample survey  
 C) An observational study      D) A census      E) NOTA

11. Out of 100 students in a school, 20 do not take Calculus or Statistics and 20 take both Calculus and Statistics. The total number of students that take Calculus is equal to the total number of students that take Statistics. How many students take Calculus?

- A) 20      B) 30      C) 50      D) 60      E) NOTA

12. During the previous election, exit polls were conducted by selecting every fifth person that walked out of the various voting sites, handing them a survey asking how they voted, and letting them place it anonymously in a box. This is an example of what type of sampling?

- A) Simple Random Sampling      B) Systematic Sampling  
 C) Stratified Sampling      D) Cluster Sampling      E) NOTA

13. Which of the following is **NOT** true for the chi-square distributions?

- A) Total area under the curve is equal to 1.
- B) Bell-shaped and symmetric about zero.
- C) As the number of degrees increase, the curve looks more and more like a normal curve.
- D) After it peaks, the curve approaches the x-axis asymptotically.
- E) NOTA

14. Which of the following is **NOT** true for a geometric distribution?

- A) There is a fixed number of observations.
- B) Each observation has only two possible outcomes, "success" or "failure."
- C) The probability of success is the same for each observation.
- D) Our interest is in the number of trials until the first success.
- E) NOTA

For questions 15 - 17: You are given the regression equation

$Temp = 30 - .5(Dist)$  where  $Temp$  is the temperature on a sensor in  $^{\circ}C$  and  $Dist$  is the distance in centimeters from the sensor to a heat source.

15. Which of the following is **NOT** a reasonable conclusion?

- A) The predicted temperature of the heat source is  $30^{\circ}C$ .
- B) The predicted temperature decreases approximately  $.5^{\circ}C$  for each centimeter the sensor is moved away from the heat source.
- C) We can predict that the sensor displays a temperature of  $25^{\circ}C$  when the sensor is 10 centimeters away from the heat source.
- D) There is a positive association between temperature and distance.
- E) NOTA

16. Which of the following **MUST** be a nonnegative?

- A) The slope of the regression line.
- B) The correlation coefficient.
- C) The coefficient of determination.
- D) The residual when the sensor is 10 centimeters from the heat source.
- E) NOTA

17. If the residual when the sensor is a distance of 8 centimeters from the heat source is -3, find the temperature reading on the sensor?

- A)  $22^{\circ}C$     B)  $23^{\circ}C$     C)  $26^{\circ}C$     D)  $29^{\circ}C$     E) NOTA



24. A researcher is working on a new treatment for a disease. The average survival time after standard treatment is two years. In a trial on three subjects using the new treatment, the average survival time is four years. Although the survival time has doubled, the results are not statistically significant at any reasonable level because
- A) the placebo effect is present, which limits the statistical significance.
  - B) the sample size is too small.
  - C) although the survival time has doubled, it's still only two years.
  - D) the sample size for the standard treatment is not known.
  - E) NOTA
25. Which of the following is a valid probability density function on the interval  $[0, 2]$ ?
- A)  $f(x) = 0.5x$
  - B)  $f(x) = x$
  - C)  $f(x) = 2x$
  - D)  $f(x) = 3 - 1.5x$
  - E) NOTA
26. In determining the ratings of TV shows, a company gathers data on many variables. Which of the following is categorical?
- A) Age of viewers in years
  - B) Family income of viewers
  - C) Gender of viewers
  - D) Number of TVs in the household
  - E) NOTA
27. Which of the following is **NOT** possible?
- A) The standard deviation is greater than the mean.
  - B) The 5-number summary has 3 identical values.
  - C) The mean is negative and the standard deviation is positive.
  - D) The mean is positive and the standard deviation is negative.
  - E) NOTA
28. Each time Mower Depot receives a shipment of 50 mowers, one of them is defective. How many mowers would we expect Joe's Lawn Service to buy before it comes across a defective mower?
- A) 1
  - B) 2
  - C) 25
  - D) 50
  - E) NOTA

For questions 29 & 30: The following table displays the results of a sample of 100 in which the subjects indicated their favorite sport and age group.

<b>Age</b>	<b>Football</b>	<b>Baseball</b>	<b>Soccer</b>
Over 40	15	8	7
Between 20 and 40	20	15	15
Under 20	8	4	8

29. When performing a Chi-Square Test for Independence, what degrees of freedom should be used?

- A) 1      B) 3      C) 4      D) 6      E) NOTA

30. When performing a Chi-Square Test for Independence, what is the expected number of Under 20s who choose Soccer as their favorite sport?

- A) 6      B) 8      C) 20      D) 30      E) NOTA