Math 207   Final Exam   NAME

Mark your answer by circling the appropriate letter. Failure to turn in exam will result in a grade of zero.

1. 5pts. The sample variance is proportional to the sum of squared deviations about what measure?
A. sample median
B. the value zero
C. sample mean
D. sample mode

2. 5pts. The number of children in a family is an example of what kind of variable?
A. continuous variable
B. discrete variable
C. categorical variable
D. true variable

3. 5pts. The result of rounding the following set of numbers, (1.5, 3.6, 4.5, 7.7), to the nearest integer is what?
A. (1, 3, 4, 7)
B. (2, 4, 4, 8)
C. (2, 4, 5, 8)
D. (1, 4, 5, 8)

4. 5pts. The temperature scales of Fahrenheit and Celsius are examples of what type of measurement scale?
A. nominal scale
B. ordinal scale
C. interval scale
D. ratio scale

5. 5pts. True or False: "The standardized scores for any distribution will have mean = 1 and variance = 1."
A. True
B. False

6. 5pts. True or False: "For any distribution of scores, the sum of the deviations about their mean is always zero."
A. True
B. False

7. 5pts. True or False: "The parameters of a population are used to estimate the statistics of a sample."
A. True
B. False

8. 5pts. For a distribution of scores which is symmetric, which of the following is true?
A. the mean is larger than the median
B. the mean and median are equal
C. the mode is smaller than the median and the median is smaller than the mean
D. all scores are less than the mode

9. 5pts. True or False: "For a distribution which is negatively skewed, the left tail is longer than the right tail."
A. True
B. False

10. 5pts. For the following sample of scores (1, 3, 5, 7, 9, 11), what is the mean, median and variance?
A. mean = 6, median = 6, variance = 14
B. mean = 6, median = 5, variance = 70
C. mean = 7.2, median = 6, variance = 14
D. mean = 6, median = 6, variance = 11.7

11. 5pts. The extent to which scores in a distribution deviate from their central tendency is called the
A. mean
B. skewness
C. quartile range
D. variability
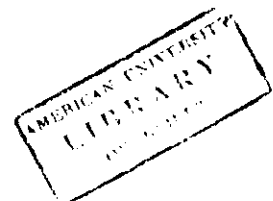
12. 5pts. Let the variable X have a normal distribution with mean = 8 and standard deviation = 2. Then what fraction of the distribution is between 5.4 and 10.6?
A. 0.4032
B. 0.8064
C. 0.5
D. 0.6568

13. 5pts. Let the variable X have a normal distribution with mean = 8 and standard deviation = 3. Then approximately what percent of the distribution of X will be within two standard deviations of the mean?
A. 95%
B. 99%
C. 68%
D. 75%

14. 5pts. The variable X has mean = 5 and variance = 9. If Y = 2X + 3, what is the mean and variance of Y?
A. mean = 5, variance = 18
B. mean = 5, variance = 21
C. mean = 13, variance = 36
D. mean = 13, variance = 21

15. 5pts. For the following sample of scores, (1, 2, 3, 6, 7, 8, 11, 12, 13, 16, 17, 18) what is the 75th percentile?
A. 13.5
B. 13
C. 16
D. 14.5

16. 5pts. The standard deviation of X is 9 and the standard deviation of Y is 16. In a regression of Y on X, the slope of the regression line is 0.8. What is the correlation between X and Y?
A. 0.45
B. 0.6
C. 0.7
D. 0.8

17. 5pts. True or False: "In a linear regression of Y on X, any value of X will result in a good predicted value."
A. True
B. False

18. 5pts. In random sampling, the distribution of a statistic is called the
A. sampling distribution.
B. sample distribution.
C. theoretical distribution.
D. empirical distribution.

19. 5pts. In a scatterplot of Y versus X, it is observed that high values of X occur with low values of Y and low values of X occur with high values of Y. What comment could be made about the relation between X and Y?
A. The correlation between X and Y is close to zero.
B. There is a positive correlation between X and Y.
C. A regression line of Y on X will have positive slope.
D. There is a negative correlation between X and Y.

20. 5pts. Let the variable Y have a normal distribution with mean = 5 and standard deviation = 3. What is the probability of getting a value of Y less than 8?
A. 0.3413
B. 0.5
C. 0.8413
D. 0.1587

21. 5pts. True or False: "The correlation of X and Y is always different than the correlation of bX + a and Y.."
A. True
B. False

22. 5pts. The relative frequency of an event from a very large number of trials is called the
A. Central Limit Theorem.
B. probability of the event.
C. sampling distribution.
D. population distribution.

23. 5pts. True or False: "For random sampling and a large sample size, the sampling distribution of the sample mean is normal by the Central Limit Theorem."
A. True
B. False

24. 5pts. The standard deviation of the sample mean is the
A. usual errors associated with sampling.
B. standard error of the sampling distribution.
C. standard deviation of the sample distribution.
D. standard deviation of the population distribution.

25. 5pts. True or False: "In simple random sampling the N elements selected have a greater probability of selection than the remaining elements in the population."
A. True
B. False

26. 5pts. True or False: "A type I error occurs if H_0 is rejected when H_0 is true."
A. True
B. False

27. 5pts. A sample of size 61 is drawn from a population with population variance equal to 15.25. The sample mean is 23. What is the 95% confidence interval for the population mean?
A. (22, 24)
B. (22.5, 23.5)
C. (22.02, 23.98)
D. (22.87, 23.13)

28. 5pts. True or False: "The average value of a consistent estimator over all possible samples of size N is equal to the population parameter."
A. True
B. False

29. 5pts. From 10,000 trials it is found that event A occurs 6,000 times. The probability of event A is
A. 0.5.
B. 0.4
C. 0.6
D. none of the above.

Use the following information to answer problems 30, 31 and 32.
    A new curriculum is introduced to students with the intent of improving the students performance on a standardized exam. Before the curriculum the standardized exam has mean 75. After the curriculum a sample of 36 students has a mean of 78 and a standard deviation of 4.

30. 5pts. What is the distribution of the test statistic for testing that the curriculum has improved exam scores?
A. t(36)
B. Z, standard normal
C. t(35)
D. none of the above

31. 5pts. What are the null and alternative hypotheses for testing that the curriculum has improved exam scores?
A. $H_0 : \mu = 75$ vs $H_1 : \mu \neq 75$
B. $H_0 : \mu \geq 75$ vs $H_1 : \mu < 75$
C. $H_0 : \mu \leq 75$ vs $H_1 : \mu > 75$
D. $H_0 : \mu \leq 75$ vs $H_1 : \mu > 78$

32. 5pts. What is the value of the test statistic for testing that the curriculum has improved exam scores?
A. 27
B. 4.5
C. -4.5
D. 9

Use the following information to answer problems 33 and 34.

A study records for a sample of 27 first graders their score on a standardized exam before and after a certain curriculum. The differences in the exam scores have a sum of 54 and sample variance of 42.

33. 5pts. What are the critical values for $\alpha = 0.05$ of a test that the mean of the standardized exam has changed from before to after the curriculum?
A. ±2.048
B. ±1.96
C. ±2.056
D. ±2.052

34. 5pts. What is the value of the test statistic for testing that the mean of the standardized exam has changed from before to after the curriculum?
A. 43.3
B. 1.6
C. 0.25
D. 6.7

35. 5pts. Two samples are drawn from independent populations with sample sizes $N_1 = 24$ and $N_2 = 18$. What are the critical values of a test that the two population means are different for $\alpha = 0.05$?
A. 2.021
B. ±1.96
C. ±2.021
D. ±2.042

Use the following information to answer problems 36 and 37.

Two samples are selected from independent groups of males and females to investigate the correlation of IQ between mother and child. Sample 1 has 22 males with a correlation of 0.33 as an estimate of the population correlation ρ_1. Sample 2 has 37 females with a correlation of 0.67 as an estimate of the population correlation ρ_2.

36. 5pts. For $\alpha = 0.05$, what is the critical value of the correlation for a test that ρ_2 is positive?
A. 0.4227
B. 0.3598
C. 0.3246
D. 0.2746

37. 5pts. What are the null and alternative hypotheses for testing the correlation of males is different than females?
A. $H_0 : \rho_1 = \rho_2$ vs $H_1 : \rho_1 \neq \rho_2$
B. $H_0 : \rho_1 \geq \rho_2$ vs $H_1 : \rho_1 < \rho_2$
C. $H_0 : \rho_1 \leq 0$ vs $H_1 : \rho_1 > 0$
D. $H_0 : \rho_1 \leq \rho_2$ vs $H_1 : \rho_1 > \rho_2$

38. 5pts. True or False: "Statistical difference will always correspond to a practical difference."
A. True
B. False

39. 5pts. True or False: "Rejecting H_0: $\rho_1 = 0$ and not rejecting H_0: $\rho_2 = 0$ is equivalent to rejecting H_0: $\rho_1 = \rho_2$."
A. True
B. False

40. 5pts. True or False: "For a fixed significance level, a nondirectional test will have a larger critical value than a corresponding directional test."
A. True
B. False