

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

一、單選題 (80 分，每題 4 分，答錯者倒扣 1 分)

1. In a questionnaire, respondents are asked to mark the classification of student class (freshman, sophomore, junior, senior). The measurement scale for the classification of student class is
 - (A) interval scale
 - (B) ratio scale
 - (C) nominal variable
 - (D) ordinal variable
2. If there is a missing value in data table, which of following treatments is most not appropriate?
 - (A) delete the column (variable)
 - (B) replace by the mean of other values
 - (C) delete the row (observation)
 - (D) find the correct value
3. How do the mean, median, and mode compare to each other when the distribution is negatively skewed?
 - (A) $\text{mean} < \text{median} < \text{mode}$
 - (B) $\text{mean} > \text{median} > \text{mode}$
 - (C) $\text{mean} = \text{median} = \text{mode}$
 - (D) cannot be determined.
4. Which graph do you think is the most not appropriate display if you have the test scores of 50 students?
 - (A) bar chart
 - (B) Q-Q plot
 - (C) histogram
 - (D) box plot
5. Which of following statistic is not affected by data shift?
 - (A) mean
 - (B) median
 - (C) standard deviation
 - (D) the first quartile
6. If the sample standard deviation is 0, which of the following statements is correct?
 - (A) The population standard deviation is 0.
 - (B) The population median is 0.

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(C) The sample median is 0.

(D) The sample range is 0.

7. A person surveyed 100 students, 60 of whom did not have a student loan and 40 students had a student loan, 24 of the students who have a student loan are working, and 24 of the students who do not have a student loan are working. Which of the following is true?

(A) The proportion of students who have a student loan is 0.6

(B) Among the students who have a student loan, the proportion of those who work is 0.4.

(C) The event whether the student has a student loan and the event whether the student is working are independent.

(D) Select one student from this survey, the probability that the student is working is 0.48.

8. Which of the following statements is not true?

(A) The empirical rule must be applied to the data with normal distribution.

(B) The Chebyshev's Theorem must be applied to the data with normal distribution.

(C) The empirical rule and Chebyshev's theorem are to find out the proportion of data in a certain interval.

(D) Chebyshev's theorem is that at least $(1-1/z^2)$ of the data values must be within z standard deviations of the mean, where z is any value greater than 1.

9. Which of the following variables is a discrete random variable?

(A) The number of gallons of milk sold at a grocery store last week

(B) The required time of waiting for an elevator

(C) The amount of milk produced by a cow in one 24-hour period

(D) The temperature of a classroom

10. If 90% of the students pass in an exam of Statistical Methods, 10 students are randomly selected to estimate the proportion of students passing the exam in the population. Which of the following statements is not true?

(A) The population is all the students of the examination.

(B) There are 9 students to pass the exam.

(C) The parameter is the proportion of students passing the exam in the population.

(D) The population proportion is 90%.

11. Let X be the number of students who pass an exam from 10 randomly selected students.

Which of the following statements is not true if the population proportion is 0.9?

(A) X is a binomial distribution

(B) X is a discrete random variable

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(C) The expected value of X is 9

(D) The standard deviation of X is 0.9

12. An assistant often typed a typo. Let X be the number of typo error per page. If X is Poisson distribution and the average number of errors per page was 3.0. Which of the following statements is not true?

(A) The mean of X is 3.0

(B) The variance of X is 3.0.

(C) $P(X=1) = e^{-3}$

(D) $P(X > 0) = 1 - e^{-3}$

13. In a survey about how long a student found a job after graduation. 30 students are randomly selected. The sample mean is 50.5 (days), and the sample standard deviation is 15 (days). Assuming that the data is normally distributed, Which of the following is wrong?

(A) The point estimate of the population mean is 50.5.

(B) The point estimate of the population standard deviation is 15.

(C) The proportion of data falling into the interval (20.5, 80.5) is 75%.

(D) The proportion of data falling into the interval (21.1, 79.9) is about 95%.

14. Which of the following is true about the description of the Type II error?

(A) We do not reject the null hypothesis when the null hypothesis is true.

(B) We reject the null hypothesis when the null hypothesis is true.

(C) We do not reject the null hypothesis when the alternative hypothesis is true.

(D) We reject the null hypothesis when the alternative hypothesis is true.

15. Which of the following is true about the significance level?

(A) The significance level is also called the confidence level.

(B) It is the maximum probability of the allowable occurring type I error.

(C) The significance level is the P value.

(D) The significance level is one minus the probability of occurring type I error.

16. At 95% confidence, how large a sample should be taken to obtain a margin of error of .03 for the estimation of a population proportion?

(A) 534

(B) 752

(C) 1068

(D) 1842

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17. If you want to predict how fast a student to find a job through the student's grades and whether he has completed a secondary or double major, which of the following analysis methods is most appropriate?

- (A) Variance analysis
- (B) Two sample t test
- (C) Chi-square independence test
- (D) Regression analysis

18. For analysis of variance, which of the following assumptions is not required?

- (A) The data is normally distributed.
- (B) The population means must be equal for all of the populations.
- (C) The observations must be independent.
- (D) The variance is equal for all of the populations.

19. If there is no linear relationship between X and Y, which of the following statements is correct

- (A) The intercept is 0.
- (B) The slope is 0.
- (C) The variance of X is 0.
- (D) The variance of Y is 0.

20. Which of the following analysis methods is most suitable for comparing the average scores of different departments in statistical competition exam?

- (A) Variance analysis
- (B) Two sample t test
- (C) Chi-square independence test
- (D) Regression analysis

二、簡答題：(20分)

1. What is the Bayes' theorem? (5%)

2. What condition is that binomial probabilities can be approximated by the normal probability distribution? (5%)

3. What assumptions are required for regression analysis? (5%)

4. What is the adjusted multiple coefficient of determination? When will you use it? (5%)