Assignment B

Due on 2014-06-25, 23:59:59

1. Consider the following stem-and-leaf plot for the data. Which of the following statements about the data are true?
   a. The data are symmetric.
   b. The data are skewed to the right.
   c. The mode is 15.
   d. The median is 17.

2. A random variable X follows a normal distribution with mean 100 and variance 4. Find the probability that X is greater than 105.

3. The correlation coefficient between two variables is 0.8. What can you infer about the relationship between these variables?
   a. A strong positive linear relationship.
   b. A weak positive linear relationship.
   c. A strong negative linear relationship.
   d. No linear relationship.

4. A study found that the average height of a group of men is 180 cm with a standard deviation of 10 cm. If we assume that the heights are normally distributed, what is the probability that a randomly selected man is taller than 190 cm?

5. What are the assumptions for using the t-test in a hypothesis test?
   a. The sample must be random.
   b. The population must be normally distributed.
   c. The sample size must be large.
   d. All of the above.

6. What are the steps involved in conducting a hypothesis test?
   a. State the null and alternative hypotheses.
   b. Choose a significance level.
   c. Calculate the test statistic.
   d. Make a decision based on the test statistic.
   e. All of the above.

7. What does a Type I error mean in the context of hypothesis testing?
   a. Rejecting the null hypothesis when it is true.
   b. Failing to reject the null hypothesis when it is false.
   c. Accepting the null hypothesis when it is false.
   d. Rejection of the alternative hypothesis when it is true.

8. A company claims that their new product increases average test scores by 10%. A random sample of 50 students who used the product showed an average increase of 12% with a standard deviation of 5%. At a significance level of 0.05, is there sufficient evidence to support the company's claim?

9. What is the difference between a t-test and a z-test?
   a. A t-test is used when the population standard deviation is unknown.
   b. A t-test is used when the sample size is small.
   c. A z-test is used when the population standard deviation is known.
   d. All of the above.

10. Which of the following statements about hypothesis testing are incorrect?
    a. The null hypothesis is always a statement of “no effect” or “no difference.”
    b. The alternative hypothesis is a statement that there is an effect or a difference.
    c. The significance level is the probability of making a Type I error.
    d. The p-value is the probability of rejecting the null hypothesis when it is true.

11. Given the following linear regression model: Y = 5 + 2X, where Y is the dependent variable and X is the independent variable.
    a. Predict the value of Y when X = 3.
    b. Calculate the coefficient of determination.
    c. Interpret the slope.
    d. All of the above.

12. What is the difference between a correlation coefficient and a regression coefficient?
    a. A correlation coefficient measures the strength and direction of a linear relationship, while a regression coefficient measures the slope of the regression line.
    b. A correlation coefficient ranges from -1 to 1, while a regression coefficient can be any real number.
    c. A correlation coefficient is always positive, while a regression coefficient can be positive or negative.
    d. All of the above.

13. Explain why a regression model with an R-squared value of 0.8 is considered a good fit when compared to a model with an R-squared value of 0.5.

14. A study found that the average height of a group of women is 160 cm with a standard deviation of 15 cm. If we assume that the heights are normally distributed, what is the probability that a randomly selected woman is shorter than 150 cm?

15. A researcher claims that a new drug increases average response time by 20%. A random sample of 50 patients who took the drug showed an average increase of 15% with a standard deviation of 10%. At a significance level of 0.05, is there sufficient evidence to support the researcher's claim?