STATISTICS WORKSHEET-10

Q1 to Q12 have only one correct answer. Choose the correct option to answer your question.

1. Rejection of the null hypothesis is a conclusive proof that the alternative hypothesis is
a. True
b. False
c. Neither
Ans: Neither(option C)

2. Parametric test, unlike the non-parametric tests, make certain assumptions about
a. The population size
b. The underlying distribution
c. The sample size
Ans: The underline distribution (option B)

3. The level of significance can be viewed as the amount of risk that an analyst will accept when making a decision
a. True
b. False
Ans: True (option A)

4. By taking a level of significance of 5% it is the same as saying
a. We are 5% confident the results have not occurred by chance
b. We are 95% confident that the results have not occurred by chance
c. We are 95% confident that the results have occurred by chance
Ans: We are 5% confident the results have not occurred by chance (option A)

5. One or two tail test will determine
a. If the two extreme values (min or max) of the sample need to be rejected
b. If the hypothesis has one or possible two conclusions
c. If the region of rejection is located in one or two tails of the distribution
Ans: If the region of rejection is located in one or two tails of the distribution.(option C)

6. Two types of errors associated with hypothesis testing are Type I and Type II. Type II error is committed when
a. We reject the null hypothesis whilst the alternative hypothesis is true
b. We reject a null hypothesis when it is true
c. We accept a null hypothesis when it is not true
Ans: We reject a null hypothesis when it is true (option B)

7. A randomly selected sample of 1,000 college students was asked whether they had ever used the drug Ecstasy. Sixteen percent (16% or 0.16) of the 1,000 students surveyed said they had. Which one of the following statements about the number 0.16 is correct?
a. It is a sample proportion.
b. It is a population proportion.
c. It is a margin of error.
d. It is a randomly chosen number.
    Ans: It is a sample proportion.(option A)

8. In a random sample of 1000 students, $\hat{p}$ = 0.80 (or 80%) were in favour of longer hours at the school library. The standard error of $\hat{p}$ (the sample proportion) is

a. .013

b. .160

c. .640

d. .800

Ans: 013 (option A)

9. For a random sample of 9 women, the average resting pulse rate is x = 76 beats per minute, and the sample standard deviation is s = 5. The standard error of the sample mean is

a. 0.557

b. 0.745

c. 1.667

d. 2.778

Ans: 1.667 (option C)

10. Assume the cholesterol levels in a certain population have mean μ= 200 and standard deviation σ = 24. The cholesterol levels for a random sample of n = 9 individuals are measured and the sample mean x is determined. What is the z-score for a sample mean x = 180?

a. –3.75

c. –2.50

c. −0.83

d. 2.50

Ans: -2.5 (option C)

11. In a past General Social Survey, a random sample of men and women answered the question "Are you a member of any sports clubs?" Based on the sample data, 95% confidence intervals for the population proportion who would answer "yes" are .13 to .19 for women and .247 to .33 for men. Based on these results, you can reasonably conclude that

a. At least 25% of American men and American women belong to sports clubs.

b. At least 16% of American women belong to sports clubs.

c. There is a difference between the proportions of American men and American women who belong to sports clubs.

d. There is no conclusive evidence of a gender difference in the proportion belonging to sports clubs.

Ans: At least 16% of American women belong to sports clubs.(option B)

12. Suppose a 95% confidence interval for the proportion of Americans who exercise regularly is 0.29 to 0.37. Which one of the following statements is FALSE?

a. It is reasonable to say that more than 25% of Americans exercise regularly.

b. It is reasonable to say that more than 40% of Americans exercise regularly.

c. The hypothesis that 33% of Americans exercise regularly cannot be rejected.

d. It is reasonable to say that fewer than 40% of Americans exercise regularly.

Ans: It is reasonable to say that more than 40% of Americans exercise regularly (option B)

Q13 to Q15 are subjective answers type questions. Answers them in their own words briefly.

13. How do you find the test statistic for two samples?

Ans: The method for finding the test statistic for two samples depends on the specific hypothesis test being performed. However, the general approach involves calculating a standardized test statistic that measures the difference between the sample statistics under the null hypothesis, relative to the expected variability of the sampling distribution.

For example, in a two-sample t-test, the test statistic can be calculated as follows:

t = (x1 - x2) / (s_pool * sqrt(1/n1 + 1/n2))

where: x1 and x2 are the sample means of the two groups being compared s_pool is the pooled standard deviation, which is an estimate of the common standard deviation of the two populations being sampled n1 and n2 are the sample sizes of the two groups being compared

The t-value is then compared to a critical value from the t-distribution with degrees of freedom

calculated using the Welch-Satterthwaite equation, or alternatively, from a table or software. If the calculated t-value is greater than the critical value, the null hypothesis is rejected in favor of the alternative hypothesis

14. How do you find the sample mean difference?

Ans: To find the sample mean difference between two samples, you subtract the mean of one sample from the mean of the other sample.

The formula for the sample mean difference is:

sample mean difference = x1 - x2

where: x1 is the mean of the first sample x2 is the mean of the second sample

For example, suppose you want to find the sample mean difference for two samples, A and B, with sample means of 10 and 15, respectively. The sample mean difference would be:

sample mean difference = x1 - x2 = 10 - 15 = -5

In this case, the sample mean for sample B is larger than the sample mean for sample A by 5 units, which is represented by a negative value for the sample mean difference.

15. What is a two sample t test example?

Ans: A two-sample t-test is a hypothesis test used to compare the means of two independent samples. Here is an example:

Suppose a researcher is interested in comparing the average height of men and women in a population. The researcher collects two independent samples of height measurements: one sample of 50 men and another sample of 50 women.

The null hypothesis for this two-sample t-test is that there is no difference between the mean heights of men and women in the population. The alternative hypothesis is that there is a significant difference.

The researcher conducts a two-sample t-test and calculates a t-value of 2.34 with 98 degrees of freedom and a p-value of 0.022. This means that the difference between the means of the two samples is statistically significant at a significance level of 0.05, and there is evidence to reject the null hypothesis.

Based on this result, the researcher concludes that the average height of men is statistically different from the average height of women in the population. The researcher also calculates a 95% confidence interval for the difference in means, which can help provide an estimate of the range of likely differences in population means