



Department of Mechanical Engineering

MA8452 – Statistics and Numerical Methods

Unit III - MCQ Bank

Testing of Hypothesis

1. A statement made about a population for testing purpose is called?

- a) Statistic
- b) **Hypothesis**
- c) Level of Significance
- d) Test-Statistic

Answer: (B)

2. If the null hypothesis is false then which of the following is accepted?

- a) Null Hypothesis
- b) Positive Hypothesis
- c) Negative Hypothesis
- d) **Alternative Hypothesis.**

Answer: (D)

3. The type of test is defined by which of the following?

- a) Null Hypothesis
- b) Simple Hypothesis
- c) **Alternative Hypothesis**
- d) Composite Hypothesis

Answer: (C)

4. Which of the following is defined as the rule or formula to test a Null Hypothesis?

- a) **Test statistic**
- b) Population statistic
- c) Variance statistic
- d) Null statistic

Answer: (A)

5. Consider a hypothesis H_0 where $\phi_0 = 5$ against H_1 where $\phi_1 > 5$. The test is?

- a) **Right tailed**
- b) Left tailed
- c) Center tailed

d) Cross tailed

Answer: (A)

6. Type 1 error occurs when?

a) **We reject H_0 if it is True**

b) We reject H_0 if it is False

c) We accept H_0 if it is True

d) We accept H_0 if it is False

Answer: (A)

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.

Answer: (A)

8. In a random sample of 1000 students, $P = 0.80$ (or 80%) were in favor of longer hours at the school library. The standard error of P (the sample proportion) is

a) **0.013**

b) 0.160

c) 0.640

d) 0.800

Answer: (A)

9. For a random sample of 9 women, the average resting pulse rate is $\bar{x} = 76$ 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

Answer: (C)

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

a) -3.75

b) **-2.50**

c) -0.83

d) 2.50

Answer: (B)

11. Null and alternative hypotheses are statements about:

a) **population parameters.**

b) sample parameters.

c) sample statistics.

d) it depends - sometimes population parameters and sometimes sample statistics.

Answer:(A)

12. Consider a random sample of 100 females and 100 males. Suppose 15 of the females are left-handed and 12 of the males are left-handed. What is the estimated difference between population proportions of females and males who are left-handed (females – males)? Select the choice with the correct notation and numerical value.

a) $p_1 - p_2 = 3$

b) $p_1 - p_2 = 0.03$

c) $\hat{p}_1 - \hat{p}_2 = 3$

(d) **$\hat{p}_1 - \hat{p}_2 = 0.03$**

Answer: (D)

13. A random sample of 25 college males was obtained and each was asked to report their actual height and what they wished as their ideal height. A 95% confidence interval for $\mu_d =$ average difference between their ideal and actual heights was 0.8" to 2.2". Based on this interval, which one of the null hypotheses below (versus a two-sided alternative) can be rejected?

(a) **$H_0: \mu_d = 0.5$**

(b) $H_0: \mu_d = 1.0$

(c) $H_0: \mu_d = 1.5$

(d) $H_0: \mu_d = 2.0$

Answer: (A)

14. It is known that for right-handed people, the dominant (right) hand tends to be stronger. For left-handed people who live in a world designed for right-handed people, the same may not be true. To test this, muscle strength was measured on the right and left hands of a random sample of 15 left-handed men and the difference (left - right) was found. The alternative hypothesis is one-sided (left hand stronger). The resulting t-statistic was 1.80.

This is an example of:

(a) A two-sample t-test.

(b) **A paired t-test.**

(c) A pooled t-test.

(d) An unpooled t-test.

Answer:(B)

15. It is known that for right-handed people, the dominant (right) hand tends to be stronger. For left-handed people who live in a world designed for right-handed people, the same may not be true. To test this, muscle strength was measured on the right and left hands of a random sample of 15 left-handed men and the difference (left - right) was found. The alternative hypothesis is one-sided (left hand stronger). The resulting t-statistic was 1.80. Assuming the conditions are met, based on the t-statistic of 1.80 the appropriate conclusion for this test using $\alpha = .05$ is: (Table would be provided with exam.)

- (a) **df = 14, so p-value < .05 and the null hypothesis can be rejected.**
- (b) df = 14, so p-value > .05 and the null hypothesis cannot be rejected.
- c. df = 28, so p-value < .05 and the null hypothesis can be rejected.
- d. Df = 28, so p-value > .05 and the null hypothesis cannot be rejected.

Answer: (A)

16. The average time in years to get an undergraduate degree in computer science was compared for men and women. Random samples of 100 male computer science majors and 100 female computer science majors were taken. Choose the appropriate parameter(s) for this situation.

- (a) One population proportion p.
- (b) Difference between two population proportions $p_1 - p_2$.
- (c) One population mean μ_1
- (d) Difference between two population means $\mu_1 - \mu_2$**

Answer:(D)

17. A hypothesis test is conducted to test whether the mean age of clients at a certain health spa is equal to 25 or not. It is known that the population standard deviation of clients at the spa is 10. 36 clients are randomly selected, and their ages recorded, with the sample mean age being 29.8. What is your decision, at the 5% level of significance, regarding the null hypothesis that the mean age is equal to 25?

- (A)reject the null hypothesis at the 5% level of significance and conclude that the mean age of clients at the spa is less than 25
- (B)reject the null hypothesis at the 5% level of significance and conclude that the mean age of clients at the spa is not equal to 25**

(C)reject the null hypothesis at the 5% level of significance and conclude that the mean age of clients at the spa is more than 25

(D)do not reject the null hypothesis at the 5% level of significance and conclude that the mean age of clients at the spa is 25

Answer: (B)

18. According to a certain TV broadcast station, the average number of violent incidents shown per episode of a TV series is 7. A researcher believes that this has increased in the last few years. A random sample of 16 recent episodes is selected which produced a sample mean of 6.5 violent incidents. Assume that the number of violent incidents follows a normal distribution and that the population standard deviation is 1.2. What would be the conclusion of a hypothesis test, if we were to perform a hypothesis test at a 5% level of significance in order to test whether the researcher's belief is accurate or not (assume that the null hypothesis states that there is no change in the average number of violent incidents shown per episode)?

(a)**We cannot reject the null hypothesis and conclude that the mean number of violent incidents per episode has not increased**

(b)We reject the null hypothesis and conclude that the mean number of violent incidents per episode has indeed increased

(c)We reject the null hypothesis since the p-value is greater than 0.05

(d)We cannot reject the null hypothesis since the p-value is less than 0.05

Answer: (A)

19. In a criminal trial, a TYPE I error is made when

(a) A guilty defendant is set free

(b) an innocent person is convicted

(c) A guilty defendant is convicted

(d) an innocent person is set free

Answer:(B)

20. The p-value of a test is the

(a) smallest significance level at which the null hypothesis cannot be rejected

(b) largest significance level at which the null hypothesis cannot be rejected

(c) smallest significance level at which the null hypothesis can be rejected

(d) largest significance level at which the null hypothesis can be rejected

Answer: (C)

21. Which of the following p values will lead us to reject the null hypothesis, if the significance level of the test is 5%

- (a) 0.15
- (b) 0.025**
- (c) 0.20
- (d) 0.10

Answer:(B)

22. Suppose that we reject the null hypothesis at 5% L.O.S , then for which of the following L.O.S do we also reject the null hypothesis.

- (a) 6%**
- (b) 2.5%
- (c)4%
- (d)3%

Answer:(A)

23. According to a coffee research organisation, the average student drinks 3.1 cups of coffee per day. A random sample of 12 students were interviewed and their sample mean was 3.425 with a standard deviation of 0.607. What is the test statistic value for the hypothesis test that would test whether the mean number of cups of coffee drunk daily by students is different to 3.1?

- (a) $t = 1.775$**
- (b) $z = 1.85$
- (c) $t = -1.85$
- (d) $z = -1.85$

Answer:(A)

24. In two-way ANOVA with $m=5$, $n=4$, then the total degrees of freedom is

- (a)20
- (b) 19**
- (c)12
- (d) 18

Answer: (B)

25. In one-way ANOVA with total number of observations is 15 with 5 treatments then total degrees of freedom is

- (a) 75
- (b) 3
- (c) 10
- (d) **14**

Answer: (D)