

Q.6 Brief description of z-test, t-test, chi-square test, and ANOVA test.

=> z-test : used to compare means when the population variance is known & the sample size is large ( $n \geq 30$ )

T-test : used to compare means when the population variance is unknown & the sample size is small ( $n < 30$ )

chi-square test : used to determine if there is a statistically significant association between two categorical variables.

ANOVA test : used to compare the means of three or more independent groups to determine if at least one group mean is significantly different from the others.

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2. q. what is covariance?

Ans: Covariance is a measure of the joint variability between two random variables. A positive covariance indicates that the variables tend to move in the same direction, while a negative covariance indicates they tend to move in opposite directions. It is an unstandardized measure, making its magnitude difficult to interpret.

c8

c 4 Define p-value?

→ the p-value is the probability of observing a test statistic as extreme as, or more than, the one observed in the sample, assuming that the null hypothesis is true.

c 5 Differentiate type 1 and type 2 Errors?

→

Type - 1 Errors	Type - 2 Errors
* Rejecting a true null hypothesis	* Accepting a false null hypothesis.
* Controlled by significance level	* Reduced by increasing sample size.
ex. medical test. test say positive, but person is actually healthy	* ex. medical test. test say negative but person is actually sick
ex. court case innocent person declared guilty	ex. court case guilty person declared innocent.

ex. medical test.

test say positive, but person is actually healthy

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\* ex. medical test.

test say negative but person is actually sick

ex. court case

guilty person declared innocent.

(Q) Explain confidence interval and critical value? Value in confidence interval gives a range in which the true population mean is likely to lie. We are 95% confident the true mean lies inside this range.

Formula  $CI = \bar{x} \pm t_{\alpha/2} \times SE$

$$CI = 26.8 \pm 1.984 \times 0.45$$

$$CI = 1.984 \times 0.45 = 0.89 \\ CI = 26.8 \pm 0.89.$$

We are 95% confident that the true average BMI lies between 25.91 and 27.69.

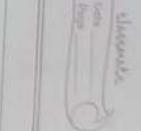
Critical value is a point of a scale of the test statistic beyond which we reject the null hypothesis defining the boundary of the rejection region.

Formula:-

$$t_{\alpha/2, n-1}$$

$$t_{0.025, 59} = 1.984$$

This is the cut off value if your calculate t-statistic is greater than 1.984 the result is significant.



Q. What is correlation?

Ans. Correlation is a standardized measure of the linear relationship between two variables ranging from -1 to +1. It indicates both the strength and direction of the linear association where a value of +1 is a perfect positive correlation and -1 is a perfect negative correlation.

## PR 3



classmate

Date

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- a) What is inferential statistics?
- ⇒ Inferential statistics is a branch of statistics that uses a random sample of data taken from a population to describe and make inferences about the population. It allows for drawing conclusions that extend beyond the immediate data alone such as testing hypothesis testing estimate population.

or what is hypothesis testing?

- ⇒ Hypothesis Testing is a statistical method used to determine if there is enough evidence in a sample of data to infer that a certain condition is true for the entire population. Its main components are the null hypothesis, the alternative hypothesis, the test statistic, the p-value and the decision rule.

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$$\text{Formula: } T = \frac{\bar{X} - \mu}{S/\sqrt{n}}$$

$\bar{X}$  = sample mean.

$\mu$  = population mean

$S$  = sample standard deviation

$n$  = sample size.

$$T = \frac{24.035 - 24}{4.8/\sqrt{100}} \\ T = 13.68$$