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Assignment

Statistical Inference.

Semester 4th (BBA).

Q1:- $n = 25 \quad S = 237.52$

$S^2 = (237.52)^2$

$= 56415.7504$

For 95% C.I $= 1 - 0.95 = 0.05$

$\alpha = 0.05$

$\alpha/2 = 0.025$

$1 - 0.02 = 0.975$

$n - 1$

$25 - 1 = 24$

critical values $\Rightarrow \alpha/2 = 0.025 = 39.364$

$1 - \alpha/2 = 0.975 = 12.401$

Now,

$$\frac{(n-1)S^2}{\chi^2 \alpha/2} \leq \sigma^2 \leq \frac{(n-1)S^2}{\chi^2_{-1} \alpha/2}$$

$$\frac{24 \times 56415.7504}{39.364} \leq \sigma^2 \leq \frac{24 \times 56415.7504}{12.401}$$

$$\frac{1353978.01}{39.364} \leq \sigma^2 \leq \frac{1353978.01}{12.401}$$

$$= \frac{34396.35252}{39.364} \leq \sigma^2 \leq \frac{1353978.01}{12.401}$$

$$34396.35225 \leq \sigma^2 \leq 109182.9699$$

For 50% C.I

$\alpha = 0.5$

$\alpha/2 = 0.25$

$1 - \alpha/2 = 0.75$

Critical values $\Rightarrow 0.25 = 28.241$

$0.75 = 19.037$

$$\frac{(n-1)s^2}{n^2\alpha/2} \leq \sigma^2 \leq \frac{(n-1)s^2}{n^2\alpha/2}$$

$$\frac{1353978.01}{28.241} \leq \sigma^2 \leq \frac{1353978.01}{19.037}$$

$$47943.69925 \leq \sigma^2 \leq 71123.49687$$

Q2:- $n_1 = 5$, $S1 = 3.4$

$n_2 = 6$ $S_2 = 2.6$

$S_1^2 \Rightarrow (3.4)^2 = 11.56$

$S_2^2 \Rightarrow (2.6)^2 = 6.76$

$v_1 = n_1 - 1 = 5 - 1 = 4$

$v_2 = n_2 - 1 = 6 - 1 = 5$

For 99% C.I

$\alpha = 0.01$

$\alpha/2 = 0.005$

$v_1, v_2 = 15.56$

$v_2, v_1 = 22.46$

Now,

$$\frac{S_1^2}{S2^2} \times \frac{1}{f\alpha/2(v_1, v_2)} < \frac{G_1^2}{G_2^2} < \frac{S_1^2}{S2^2} \times f\alpha/2(v_2, v_1)$$

$$= \frac{11.56}{6.76} \times \frac{1}{15.56} < \frac{G1^2}{G2^2} < \frac{11.56}{6.76} \times 22.46$$

$$0.1099 < \frac{G1^2}{G2^2} < 38.4079$$

For 90% C.I

$\alpha = 0.10 \qquad v_1, v_2 = 7.39$

$\alpha/2 = 0.05 \qquad v_2, v_1 = 9.36$

$$\frac{11.56}{6.76} \times \frac{1}{7.39} < \frac{S_1^2}{S^2} < \frac{11.56}{6.56} \times 9.36$$

$$0.231 < \frac{S_1^2}{S^2} < 16.0061$$

Q 3:- $\mu = 60$ $\sigma = 12$

$n = 225$

$\bar{X} = 65$

$\alpha = 2\% = 0.02$

(1) $H_0 : \mu = 60$

$H_1 : \mu \neq 60$

(2) $\alpha = 0.02$

$\alpha/2 = 0.01$

$1 - 0.01 = 0.99$

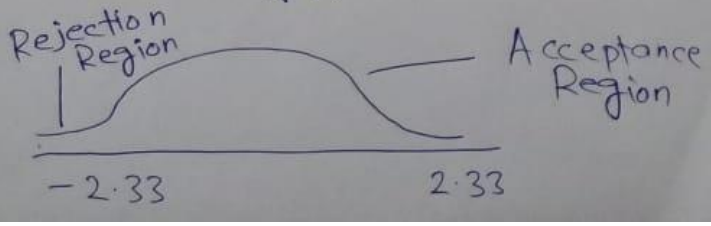
Finding Z from table

$Z = 2.33$

(3) Z-test

$$Z = = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$$

(4)



$Z > -2.33$

$Z < 2.33$

(5) $Z = \frac{65-60}{12/\sqrt{225}} = \frac{5}{0.8}$

$= 6.25$

This value 6.25 as its greater than 2.33 so it is in Rejection Region

So, we Reject H_0 and Accept H_1 i-e $\mu \neq 60$ at 2%

Now P-value

Z = P-value

$Z = 6.00$

$P(Z > 6.00) = 0.9999$

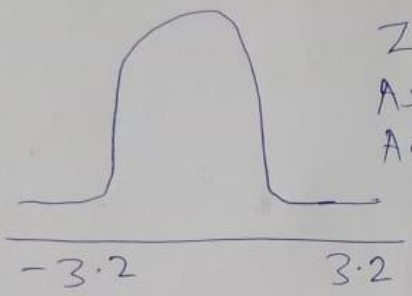
$P(Z < 6.00)$ ignored 6.25 its not in table.

$1 - 0.9999 = 0.0001$

$0.0001 < 0.02$ So we Reject H_0 and Accept H_1.

Q4:-

$Z = -1.5$
we will accept H_0 because value is an Acceptance Region.



$Z = 2.9$
As value is in Acceptance region so we accept H_0.

Q5:- $\mu = 1 \quad n = 20, \quad S = 0.02$

Now

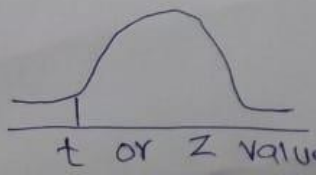
$H_0 : \mu > 1$

$H_1 : \mu < 1$

T-test will be used because σ is unknown and sample Standard deviation is known.

Nature of test is one tail b/c H_1 value is on negative side of diagram or distribution

It is left tail.



Question 06:

$\pi = 88\% = 0.88$

$n = 100$

$P = \frac{93}{100} = 0.93$

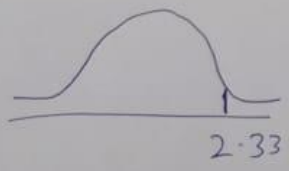
① $H_0 : \pi = 0.88$

$H_1 : \pi > 0.88$

② $\alpha = 0.01, \quad 1 - 0.01 = 0.99$

$Z = 2.33$

③ Z-test $Z = \frac{P - \pi}{\sqrt{\pi(1-\pi)}}$

④ 

$Z > 2.33$

$Z = \frac{0.05}{\sqrt{\frac{0.88 \times 0.12}{100}}}$

$\frac{0.05}{\sqrt{0.001056}} = 1.5386$

We will Accept H_0 and Reject H_1 because value 1.538 is less than 2.33 and its in Acceptance Region. $\pi > 0.88$

P-value

$P(Z > 1.5386)$

$P(Z > 1.54) = 0.9382$

$1 - 0.9382 = 0.06182$

P value $> \alpha$

So, we Accept H_0 and Reject H_1.

The End.