Session 15: Additional Exercise:-

Problem statement 1:-

① $H_0 : \mu = 25$, $H_1 : \mu \neq 25$

It is a correctly stated hypotheses as the alternate hypothesis is a negative statement and Null hypothesis has Equality.

② $H_0 : \sigma > 10$, $H_1 : \sigma = 10$

It is not a correctly stated Hypotheses as the Alternate Hypotheses is NOT a negative statement and Null Hypotheses doesn't have equality.

③ $H_0 : \bar{x} = 50$, $H_1 = \bar{x} \neq 50$.

It is a correctly stated Hypothesis as the alternate hypotheses is negative statement and the Null hypotheses has equality.

④ $H_0 : P = 0.1$, $H_1 : P = 0.5$.

It is Not a correctly stated Hypotheses as the alternate hypothesis is not a negative statement and P value is not given.

⑤ $H_0 : \Sigma = 30$, $H_1 : S < 30$.

It is not a correctly stated Hypothesis as the alternate Hypothesis is not a negative statement.

Problem statement 2:-

Given values.

$\mu = 52 \quad \sigma = 4.50 \quad n = 100 \quad \bar{x} = 52.80$

$\alpha = 0.05$

Step 1:- $H_0 : \mu = 52$

$H_a : \mu > 52$

② Compute the test statistics z:

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

$$= \frac{52.80 - 52}{4.50/\sqrt{100}}$$

$$z = 1.78$$

we find the rejection Region. Here we use significance level $\alpha = 0.05$. Therefore Reject Region is when $z > 1.65$.

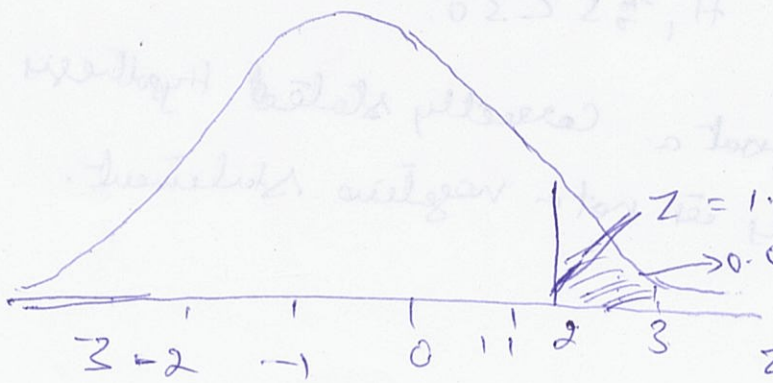
Conclusion:- Since $z = 1.7 > 1.65$

we Reject H_0.

we Compute the P-value of the test

$$P(\bar{x} > 52) = P(z > 1.78) = 0.9625$$

In a Sample size 100 with a tailed test on the right at $\alpha = 0.05$ it same as though we can not believe the bookstore's claim that the mean of test of textbook.



Problem Statement 3:-

$\mu = 34, \quad \sigma = 8, \quad \alpha = 0.01, \quad \bar{x} = 32.5 \quad n = 50.$

$H_0 : \mu = 34$

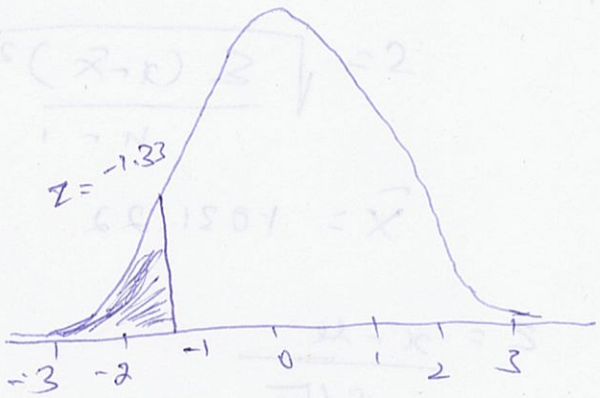
$H_a : \mu < 34$

Compute the test statistic

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

$$= \frac{32.5 - 34}{8/\sqrt{50}}$$

$$z = -1.33$$



The test statistics lies between Acceptance Region for H_0. Do not Reject H_0. Based on this on sample of size 50 with a one-tailed test on the left and $\alpha = 0.04$, it seems as though we cannot believe the factors claim that the mean amount of pollutant is less than 33 PPM. The lower the amount of pollutant is less than 33 PPM. The lower the value of 32.5 ppm is probably due to random chance.

Problem Statement 4:-

$\mu = 1135 \quad \alpha = 0.05$

Hypothesis :- $H_0 : \mu = 1135$

$H_1 : \mu \neq 1135$

The Significance level is 5%.

$$S = \sqrt{\frac{\Sigma (x - \bar{x})^2}{n-1}}$$

$\bar{x} = 1031.22$

$$z = \frac{x - \mu}{S/\sqrt{n}}$$

$$= \frac{1031.32 - 1135}{240.37/\sqrt{22}} = \frac{-103.68}{51.25}$$

$$= -2.02$$

The critical value of z is -1.96 and +1.96.

The critical value is $z = \pm 1.96$ for two tailed test at 5% level of Significance.

The compute value falls in rejection region. we reject the null hypothesis.

Problem statement 5:

$\mu = 48432 \quad s = 2000 \quad n = 400$

$\bar{x} = 48574.$

Hypotheses $H_0 : \mu = 48432.$

$H_1 : \mu \neq 48432.$

Significance level = 10%.

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

$$= \frac{48574 - 48432}{2000\sqrt{400}}$$

$$= \frac{142}{100} = 1.42$$

Since the calculated value $Z = 1.42$ falls in acceptable region.

We accept the null hypothesis.

Problem statement 6:

$\mu = 32.28. \quad s = 1.29 \quad n = 19 \quad \bar{x} = 31.67.$

Hypotheses:

$H_0 = \mu = 32.28$

$H_1 = \mu \neq 32.28.$

Significance level = 5%.

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

$$= \frac{31.67 - 32.28}{1.29/\sqrt{19}} = \frac{-0.61}{0.29} = -2.1$$

The critical values z is -1.96 and +1.96.
The critical value of Z = ±1.96 for two tailed test at 5% level of significance. Since the computed value of z = -2.1 falls in reject region. we reject the null hypothesis. The average price per square foot for the warehouse has changed now.

Problem statement 8;-

$n = 16 \quad \mu = 10 \quad \bar{x} = 12, \quad S = 1.5$

$df = N - 1 = 16 - 1 = 15.$

$$t = \frac{\bar{x} - \mu}{S_{\bar{x}}}$$

$$= \frac{12 - 10}{1.5} = \frac{2}{1.5}$$

$$S_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{1.5}{4} = 0.375$$

$$t = \frac{12 - 10}{0.375} = 5.333$$

Problem statement 9:-

$n = 16. \quad \alpha = 0.01$

$df = N - 1 = 16 - 1 = 15.$

$1 - \alpha = 0.99$

$t_{0.99} = -t_{0.01}$

$t_{0.99} = -2.602$

Problem statement 10:-

$n = 25 \qquad \mu = 60 \qquad \sigma = 5.$

$df = n - 1 = 25 - 1 = 24.$

$\alpha = .05.$

if range will be from t table $\quad -2.492$ to $+2.492.$