Stat-V:

1) In each of the following situation, state whether it is a correctly stated hypothesis testing problem and why.

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

Yes:- We will always state the null hypothesis as an equality so that the probability of type I error.

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

No.

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

No:

④ $H_0: P = 0.1$. $H_1: P = 0.5$

No:

⑤ $H_0: s$. $H_1: s > 30$.

No:

- state
hypothesis

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② Given values

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

$\alpha = 0.05$ $Z_{critical} = \underline{1.65}$

step: 1

$H_0 : \mu = 52$

$H_a : \mu > 52$

② Compute the test statistic z:

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

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

$= \cancel{0.8}$

$Z = 1.78$

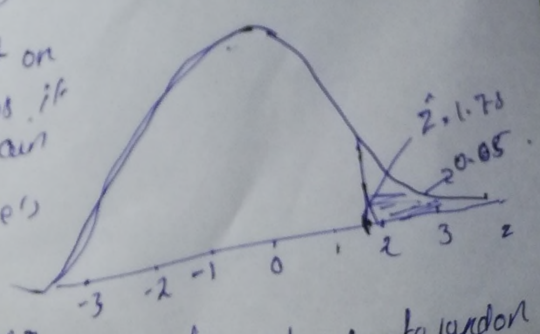
③ we find the rejection Region. Here we use significance level of $\alpha = 0.05$. There fore Rejection Region is when $z > 1.65$.

④ Conclusion: Since. $z = 1.78 > 1.65$ we Reject H_0.

we compute the p-value of the test:

$P(\bar{X} > 52) = P(Z > 1.78) = 0.\underline{962}5$

* In sample size 100 with one tailed test on the right and $\alpha = 0.05$ it seems as though we can not believe the bookstore's claim that the mean of cost of text book is 52. probably not due to random



The ... value of 52.80 ...

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

$H_0 : \mu = 34$

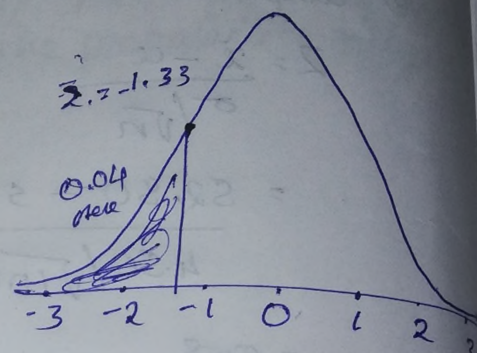
$H_a : \mu < 34$

compute the test statistic

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

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

$$z = -1.33$$



The test statistic lies on the 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 can not belive the factories claim that the mean amount of pollutant is less than 33 ppm. The lower value of 32.5 ppm is probably due to random chance.

4) $u = 1135$ $\alpha = 0.05$

Hypothesis:

$H_0 : u = 1135$

$H_1 : u \neq 1135$

The significance level is 5%.

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

$$\bar{x} = 1031.32$$

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

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

$$= \frac{-103.68}{51.25}$$

$$= -2.02$$

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.

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

$\bar{x} = 48574$

Hypothesis:

$H_0 : \mu = 48432$

$H_1 : \mu \neq 48432$

Significance level : 10%

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

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

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

$$= \underline{1.42}$$

The critical value of z is -1.645 and $+1.645$ for two tailed test at 5% level of significance. Since, the computed value of $z = 1.42$ falls in acceptance region.

We accept the null hypothesis.

6) $u = 32.28$ $s = 1.29$ $n = 19$ $x = 31.67$

Hypothesis:

$H_0 : u = 32.28$

$H_1 : u \neq 32.28$

Significance level: 5%.

$$z = \frac{\bar{x} - u}{s / \sqrt{n}}$$

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

$$= \frac{-0.61}{0.29}$$

$$= -2.1$$

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. Since the computed value of $z = -2.1$ fall in Reject region: we reject the null hypothesis. The average price per square foot for warehouse has changed now.

7).

Acceptance Region	Sample size	α	$\mu = 52$	$\mu = 50.5$)
$48.5 < \bar{x} < 51.5$	10	0.0576	0.2643	0.892
$48 < \bar{x} < 52$	10	0.0114	0.5000	0.970
$48.5 < \bar{x} < 51.5$	16	0.0164	0.2119	0.944
$48 < \bar{x} < 52$	16	0.0014	0.5000	0.991

$z_1 = \dfrac{48.5 - 52}{0.79}$ and $z_2 = \dfrac{51.5 - 52}{0.79} = -0.63$

$B = P(-4.43 \leq z \leq -0.63) = P(z \leq -0.63) - P(z \leq$

$= 0.2643 - 0.000 = 0.2643.$

when $\mu = 50.5$

$B = P(48.5 \leq \bar{x}\ 51.5$ when $50.5)$

$z_1 = \dfrac{48.5 - 50.5}{0.79} = -2.53$ $z_2 = \dfrac{51.5 - 50.5}{0.79} = 1.27$

$B = P(-2.53 \leq z \leq 1.27) = P(z \leq 1.27) - P(z \leq$

$= 0.8980 - 0.0057 = 0.8923$

* increasing the sample size results in a decrease in the probability of type II error.

8) $n=16 \quad u=10 \quad \bar{x}=12 \quad S=1.5$

$df = n-1 = 16-1 = \underline{15}$

$$t = \frac{\bar{x} - u_{hyp}}{S_{\bar{x}}}$$

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

$$= \frac{2}{1.5}$$

$\cancel{t = 1.34}$.

$$S_x = \frac{\sigma}{\sqrt{n}} = \frac{1.5}{4}$$

$$= 0.375$$

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

$$t = \underline{5.333}$$

9) $n = 16 \quad \alpha = 0.01$

$df = N - 1 = 16 - 1 = \underline{15}$

$1 - \alpha = 0.99$

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

$t_{0.99} = -\underline{2.602}$

10) $n = 25 \quad \bar{x} = 60 \quad \cancel{\sigma = 4} \quad \alpha = 0.05.$

$df = 25 - 1 = 24. \quad \bar{x} = 60. \quad s = 4$

$s_{\bar{x}} = \frac{\sigma}{\sqrt{n}}.$

$= \frac{4}{\sqrt{25}}$

$= \underline{0.8}$

$\bar{x}$ = sample mean
u = population mean
s = standard dev
n = sample

$t = \frac{\bar{x} - u_{hyp}}{s_{\bar{x}}}$ $\quad t = \frac{\bar{x} - u}{\frac{s}{\sqrt{n}}}$

$= 60 -$

$n = 25 \quad u = 60 \quad s = 4. \quad \alpha = 0.05$

$df = N - 1 = 25 - 1 = 24$

$t_{\cancel{0.95}} = \sigma = s\sqrt{n}$

$\sigma = 4\sqrt{25}$

$t = \bar{x} -$