# Statistics-5

## Q.1

(i) $H_0 = \mu = 25$ , $H_1 = \mu \neq 25$

True : Based on mean we can verify & alternatively hypothesis can be correctly noted.

(ii) $H_0$ $\sigma > 10$, $H_1$ $\sigma = 10 \longrightarrow$ false

(ii) $H_0 = \bar{x} = 50$, $H_1 = \bar{x} \neq 50 \longrightarrow$ True

(iii) $H_0 = p = 0.1$ ; $H_1 = p = 0.5 \longrightarrow$ false

(iv) $H_0 = S = 30$, $H_1 S > 30 \longrightarrow$ false.

## Q.2

$\mu = 52$ , $\sigma = 4.5$ , $n = 100$ , $\mu_S = 52.80$

$\lambda = 0.05$ $\left( \because 5\% \text{ of probability} \right)^{\frac{II}{x}}$

$$z = \frac{\bar{x} - \bar{\mu}}{(\sigma/\sqrt{n})} = \frac{52.80 - 0.52}{(4.5/10)} = \frac{0.80}{0.45} = 1.78$$

$H_1 = \mu > 52$

$H_0 = \mu \leq 52$

$p(z > 1.78) = 0.3625 \Rightarrow 36.25\%$

$\therefore$ Reject null hypothesis.

**Sol 3)**

$\mu = 34$  $\sigma = 8$.  $\Big\}$ given  $H_0 = 34$
$\bar{x} = 32.5$  $n = 50$  $H_1 = 32.5$

$$z = \frac{32.5 - 34}{8/\sqrt{50}} \approx \underline{-1.325}$$

$$P(z) = 0.0934$$
$$\Rightarrow 9.34\%$$

Reject null hypothesis

**Sol 4)**

$\mu = 1135$  $\Big\{$ given
$n = 22$

Sum of 22 families $= 22,689$

$$\bar{x} = \frac{22689}{22} = 1031.32$$

$$\sigma = 24.3746$$

$$z = \frac{1031.32 - 1135}{24.3746/\sqrt{22}} = -1.99$$

## Sol 5)

$\mu = 48432$
$n = 400$ } given
$\bar{\mu} = 48574$
$\sigma = 2000$

$z = \dfrac{48574 - 48432}{2000 / \sqrt{400}} = 1.42 \implies p(z) = 0.8719$
$= 87.19\%$

failed $\implies$ reject null hypothesis $\tau$ significance 5%

## Sol 6)

$\mu = 32.28$
$n = 19$ } given
$\bar{\mu} = 31.67$
$\sigma = 1.29$

$\implies z = \dfrac{31.67 - 32.28}{1.29 \sqrt{19}} = -2.06 \implies p(z) = 0.0197$
$\implies 1.97\%$

$\implies$ reject Ho $\tau$ significance 5%

## Sol 7]

| Sno | Acceptance region | Sample size | α | β at N=52 | β at N=50.5 |
|-----|-------------------|-------------|---|-----------|-------------|
| 1. | $48.5 < \bar{x} < 51.5$ | 10 | | 26.43 (-4.43, -0.63) | 87.05 (-2.53, 1.28) |
| 2. | $48 < \bar{x} < 52$ | 10 | | 50.00 | 97.05 (-3.16, 1.9) |
| 3. | $48.81 < \bar{x} < 51.9$ | 16 | | 43.64 (-5.1, 0.16) | 98.4 (-2.7, 2.24) |
| 4. | $48.42 < \bar{x} < 51.58$ | 16 | | 25.14 (-5.73, -0.67) | 95.78 (-3.33, 1.73) |

## Sol 8]

$\left. \begin{array}{l} n = 16 \quad\quad \bar{u} = 12 \\ \mu = 10 \quad\quad 6 = 1.5 \end{array} \right\}$ given

$$ z = \frac{\bar{x} - \mu}{6/\sqrt{n}} = \frac{12 - 10}{1.5/\sqrt{16}} = \frac{2}{0.375} = 5.33 $$

## Sol 9] Given that n=16

$6 = 0.01$

$t = 98\%$

$z$ is as degree of freedom, 0.01% is 2.60248.

## Sol 10

$n = 25$

$\mu = 60$

$\sigma = 9$

$P(-t_{0.05} < t < t_{0.10})$ ?

∵ 23 as degree of freedom

$P(-1.713 < t < 1.319)$

$P\left(-1.716 < \dfrac{t-60}{4/\sqrt{25}} < 1.319\right)$

$= -1.716 < \dfrac{t-60}{4/5} < 1.1319$

$\Rightarrow -8.58 < \dfrac{t-60}{\cancel{4}} < 6.595$