

Q.1

$$\bar{x} = 164.7$$

$$n = 39, \quad x = 161.8 \quad sd = 5.6$$

$$\alpha = 0.01$$

$$Z = \frac{x - \mu}{\frac{sd}{\sqrt{n}}} = \frac{161.8 - 164.7}{5.6 / \sqrt{39}}$$

$$Z = -3.23$$

$$Z_c \text{ at } 0.01 \Rightarrow Z_c = -2.33$$

$$P\text{-value} : Z = -3.23 = 0.0006$$

$\therefore$ reject Null hypothesis since P-value < Significance level (0.01).

Conclusion! No enough evidence to claim that the population mean μ is less than 164.7 at ~~0.01~~ 0.01 level.

Q.2

• $n = 20$

$$\bar{X} = 2.10, \text{ s.d} = 0.33, n = 20$$

$$\alpha = 0.01$$

$$\text{Z-statistic } Z = \frac{\bar{X} - \mu_0}{\frac{s.d}{\sqrt{n}}} = \frac{2.1 - 2}{\frac{0.33}{\sqrt{20}}} = 1.36$$

$$\text{Z-critical value } \Rightarrow 99\% = 2.58$$

$$\text{P-value for } Z = 1.36 = 0.1754$$

Since P-value > 0.01

Null hypothesis is not rejected

CONCLUSION: Not enough evidence to claim that the population Mean μ is different than 2 at 0.01 level

Q.3

$$\bar{U} = 0.01 \quad \hat{P} = \frac{148}{12317} = 0.012$$

$$n = 12,317$$

$$12317$$

$$\alpha = 0.1$$

$$H_0: p = 0.01$$

$$H_a: p \neq 0.01$$

$$Z = \frac{\hat{P} - P_0}{\sqrt{P_0(1-P_0)/n}} = \frac{0.012 - 0.01}{\sqrt{0.01(1-0.01)/12317}} = \underline{\underline{2.25}}$$

two tailed test $Z_c = 1.64$

$$\text{Since } Z = 2.25 > 1.64$$

$$\text{also } P = 0.0245 < 0.1$$

Reject Null hypothesis.

No enough evidence to claim that population Proportion is different from 0.01.

Q.4

$$H_0 = p \leq 0.639$$

$$H_a = p > 0.639$$

$$\alpha = 0.01 \quad n = 36463$$

$$(\bar{p}) \bar{x} = 0.646$$

$$Z = \frac{\bar{p} - p_0}{\sqrt{p_0(1-p_0)/n}} = \frac{0.646 - 0.639}{\sqrt{0.639(1-0.639)/36463}} \\ = \underline{\underline{2.78}}$$

$$P\text{-value} = p = 0.0027 < 0.01$$

Reject Null hypothesis.

CONCLUSION! There is no enough evidence to claim that the population p is higher than 63.9%.