Stats assignment-3

(1)

Ans $H_0 : \mu = 100$

$H_1 : \mu \neq 100$

Level of Significance $\alpha = 0.05$ (assumed)

$\bar{x} = 108, \quad n = 36, \quad \sigma = 15$

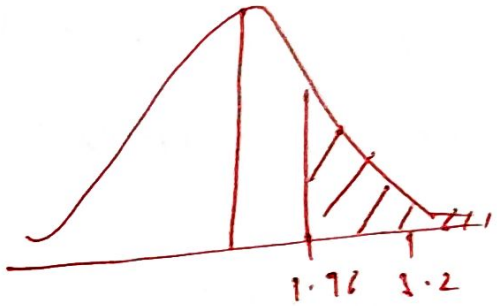
$Z\alpha = 0.05$

$Z\alpha/2 = 0.025$

$Z_{\alpha/2} = 1.96$

$$Z_{cal} = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{108 - 100}{\frac{15}{\sqrt{36}}}$$

$\boxed{Z_{cal} = 3.2}$



$\therefore$ Since $Z_{cal} > Z_{tab}$

$\therefore$ reject the null hypothesis

(2)

Ans

$n_1 = 100$ P_1 = voters in first state

$n_2 = 100$ P_2 = voters in second state

$n_1 P_1 = 100 \times 0.52 = 52$

$n_2 P_2 = 100 \times 0.47 = 47$

$n_1(1-P_1) = 100 \times 0.48 = 48$

$n_2(1-P_2) = 100 \times 0.53 = 53$

Each are greater than 10, the Sample size is large enough

Mean Diff in sample proportion

$$E(P_1 - P_2) = P_1 - P_2 = 0.52 - 0.47$$
$$= 0.05$$

Std difference

$$\sigma d = \sqrt{P_1(1-P_1)/n_1 + P_2(1-P_2)/n_2}$$

$$\sigma d = \sqrt{0.52 \times 0.49/200 + 0.47 \times 0.53/100}$$

$$\sigma d = 0.0706$$

$$Z_{P_1 - P_2} = \frac{x - \mu P_1 - P_2}{\sigma d}$$

$$= \frac{0 - 0.05}{0.0706} \simeq 0.7082$$

$$P(Z \leq 0.7082)$$

$$0.24$$

The prob that the survey will show a greater percentage of republican voters in second state than in first state is 0.24

(3)

Ans

$\bar{X} = 1026$

$\sigma = 209$

$x = 1100$

$$\Rightarrow P(Z < x) = P\left(Z < \left(\frac{x - \bar{x}}{\sigma}\right)\right)$$

$$= P\left(Z < \left(\frac{1100 - 1026}{209}\right)\right)$$

$$= P(Z < 0.35)$$

$$= 0.6368$$

$\Rightarrow$ 63.68% people scored below you