एनटीपीसी NTPC

Assignment_ 18.2

Let p_1 = proportion of population of republican voters in 1st state.

P_2 = the proportion of republican voters in 2nd state.

p_1 = proportion of republican voter in the sample from the 1st state.

p_2 = No. of voters sampled = n_1 (first state) = 100.

No. of voters sampled = n_2 (2nd state) = 100.

Now $n_1 p_1 = 100 \times 0.52 = 52$.

$n_1(1-p_1) = 100 \times 0.48 = 48$

Similarly, $n_2 p_2 = 100 \times 0.47 = 47$

& $n_2(1-p_2) = 100 \times 0.53 = 53$.

Finding mean of the difference in sample proportion:-

$\mu_{(p_1-p_2)} = 0.52 - 0.47 = 0.05$.

Finding the SD (standard deviation) of the difference:

$$\sigma_d = \sqrt{\frac{p_1(1-p_1)}{n_1} + \frac{p_2(1-p_2)}{n_2}}$$

$$= \sqrt{\frac{(0.52)(0.48)}{100} + \frac{(0.47)\times(0.53)}{100}}$$

$$= \sqrt{0.002496 + 0.002491} = \sqrt{0.004987} = 0.0706$$

Now we are required to find the probability that $p_1 < p_2$.

This is equivalent to finding the probability that $p_1 - p_2 < 0$

$\therefore Z_{p_1-p_2} = (x - \mu_{p_1-p_2})/\sigma_d = (0 - 0.05)/0.0706$

$= -0.7082$.

Using Normal distribution calculator we get that probability of Z-score being -0.7082 or less is $\boxed{0.24}$ Ans $\therefore$ Answer is 0.24