Answer on Question #42249-Math-Statistics and Probability

Assume that the samples are independent and that they have been randomly selected. Construct a 90% confidence interval for the difference between population proportions p1-p2. Round to three decimal places.

x1=24, n1=51, x2=29, n2=56

Solution

The confidence interval estimate of the difference $p_1 - p_2$ is

$$\widehat{p_1} - \widehat{p_2} - \mathrm{E} < p_1 - p_2 < \widehat{p_1} - \widehat{p_2} + E.$$

Where the margin of error E is given by

$$E = z_{\alpha/2}\sqrt{\frac{\widehat{p_1}\cdot\widehat{q_1}}{n_1} + \frac{\widehat{p_2}\cdot\widehat{q_2}}{n_2}}.$$

$x_1 = 24, n_1 = 51, x_2 = 29, n_2 = 56.$

$$\widehat{p_1} - \widehat{p_2} = \frac{x_1}{n_1} - \frac{x_2}{n_2} = \frac{24}{51} - \frac{29}{56} = -0.047.$$

$z_{\alpha/2}$ for a 90% confidence interval is $z_{0.05} = 1.645.$

$$E = 1.645 \cdot \sqrt{\frac{\frac{24}{51}\cdot\frac{27}{51}}{51} + \frac{\frac{29}{56}\cdot\frac{27}{56}}{56}} = 0.159.$$

The confidence interval estimate of the difference $p_1 - p_2$ is

$$-0.047 - 0.159 < p_1 - p_2 < -0.047 + 0.159.$$

Answer: (-0.206; 0.112).