

Answer on Question # 41698, Math, Statistics

A recent survey of 200 households showed that 8 had a single male as the head of the household. For years ago, a survey of 200 households showed that 6 single male as the head of the household. Alpha = 0.05, can it be concluded that the proportion has changed.

Solution

Null hypothesis: the proportion don't change, alternative hypothesis: the proportion has changed.

We need two-tailed test.

The formula for a test statistic for proportions is:

$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}}$$

So, from our problem we need a proportion from a sample $\hat{p} = \frac{6}{200} = 0.03$, the proportion from our hypothesis $p_0 = \frac{8}{200} = 0.04$ (which means that $q_0 = 0.96$), and a sample size $n = 200$.

So our test statistic is

$$z = \frac{0.03 - 0.04}{\sqrt{\frac{0.04 \cdot 0.96}{200}}} = -0.72.$$

The P-value is the probability of observing a sample statistic as extreme as the test statistic. In this case $P(z < -0.72) = 0.2358$ and $P(z > 0.72) = 0.2358$. So our P-value is

$$p - \text{value} = P(z < -0.72) + P(z > 0.72) = 0.4715.$$

Decision - p-value > alpha:

$$p - \text{value} = 0.4715 > \alpha = 0.05.$$

Conclusion:

There is not enough evidence to suggest that the proportion has changed.