# Answer on Question #62171 – Math – Statistics and Probability

## Question

According to the US Census Bureau, 7.1% of Americans living in 2010 were between the ages of 20 and 24. Suppose that a random sample of 50 Americans taken this year found 6 between the ages of 20 and 24. If appropriate, test whether the population proportion has increased since 2010, using level of significance

## Solution

Null hypothesis $H_0$: $p = 0.071$.

Alternative hypothesis $H_a$: $p > 0.071$.

The sample is large, because

$n = 50 > 30$.

Test statistic:

$$z_* = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} = \frac{\frac{6}{50} - 0.071}{\sqrt{\frac{0.071(1-0.071)}{50}}} = 1.349.$$

For $z_* = 1.349$ in the right-tailed test,

the p-value is

$p = P(Z > 1.349) = 1 - P(Z < 1.349) = 1 - 0.9113 = 0.0877 > \alpha = 0.05$.

For the right-tailed test and $\alpha = 0.05$,

the critical value is

$z_{crit} = 1.645$,

hence

$z_* = 1.349 < z_{crit} = 1.645$,

so the value of the test statistic does not fall in the rejection region.

Thus, we can't reject the null hypothesis and should conclude that there is no sufficient evidence of increasing population proportion.

**Answer:** there is no sufficient evidence of increasing population proportion at $\alpha = 0.05$.