

## Answer on Question #77602 – Math – Statistics and Probability

### Question

A telephone company representative estimates that 40% of its customers have call-waiting service. To test this hypothesis, she selected a sample of 100 customers and found that 37% had call waiting. At  $\alpha = 0.01$ , is there enough evidence to reject the claim?

### Solution

We define null and alternative hypotheses:

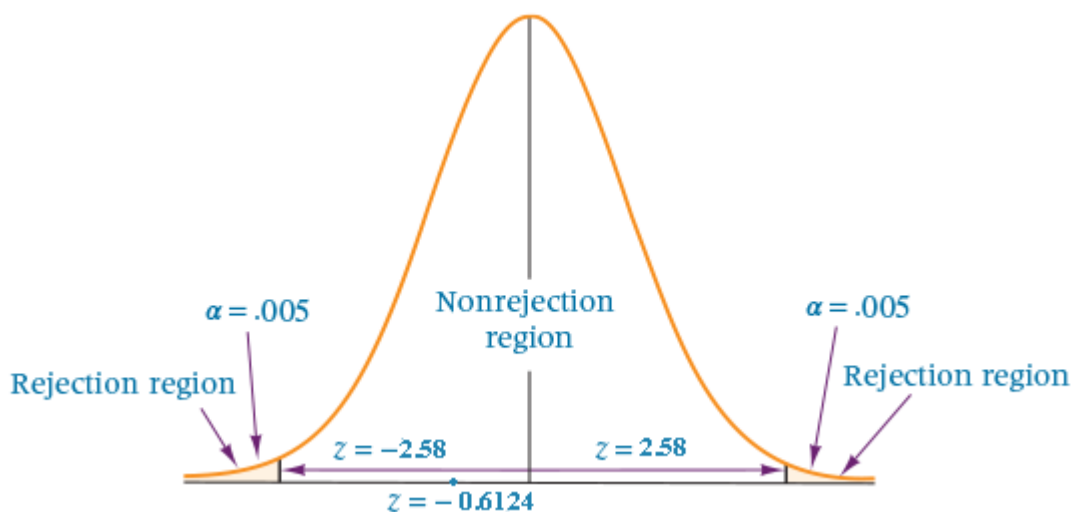
$$H_0: p = 0.40,$$

$$H_a: p \neq 0.40.$$

Next we find a critical value. Since  $\alpha = 0.01$  and the test is a two-tailed test, the critical values are  $Z_c = \pm 2.58$ .

So, we calculate the value of the test statistic:

$$\hat{p} = 0.37, \quad p = 0.40, \quad q = 1 - p = 1 - 0.40 = 0.60, \quad n = 100,$$
$$Z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}} = \frac{0.37 - 0.40}{\sqrt{\frac{0.40 \cdot 0.60}{100}}} = \frac{-0.03 \cdot 10}{\sqrt{0.4 \cdot 0.6}} = \frac{-0.3}{\sqrt{0.24}} = -0.6124.$$



Since the test value falls outside the rejection region, the statistical conclusion is to fail to reject the null hypothesis.

Hence, there is not enough evidence to reject the claim that 40% of the telephone company's customers have call waiting.