

## Answer on Question #79712 – Math – Statistics and Probability

### Question

Past records from a large supermarket show that 20% of people who buy chocolate bars buy the family size bars. On one particular day a random sample of 30 people was taken from those that had bought chocolate bars and 2 of them were found to have bought a family size bar.

1) test at the 5 % significance level, whether or not the proportion of people who bought a family size bar of chocolate that day had decreased. State your hypothesis clearly.

### Solution

The following information is provided: The sample size is  $N = 30$ , the number of favorable cases is  $X = 2$ , and the sample proportion is  $\bar{p} = \frac{X}{N} = \frac{2}{30} = 0.0667$ , and the significance level is  $\alpha = 0.05$

The following null and alternative hypotheses need to be tested:

$$H_0: p = 0.2$$

$$H_a: p < 0.2$$

This corresponds to a left-tailed test, for which a z-test for one population proportion needs to be used.

Based on the information provided, the significance level is  $\alpha = 0.05$ , and the critical value for a left-tailed test is  $z_c = -1.64$ .

The rejection region for this left-tailed test is  $R = \{z: z < -1.64\}$

The z-statistic is computed as follows:

$$z = \frac{\bar{p} - p_0}{\sqrt{p_0(1 - p_0)/n}} = -1.826$$

Since it is observed that  $z = -1.826 < z_c = -1.64$ , then one concludes that *the null hypothesis is rejected*.

Using the P-value approach: The p-value is 0.0339, and since  $0.0339 < 0.05$ , one concludes that the null hypothesis is rejected.

### Conclusion

The null hypothesis  $H_0$  is *rejected*. Therefore, there is enough evidence to claim that the population proportion  $p$  is less than  $p_0 = 0.2$  at the  $\alpha = 0.05$  significance level.

Answer provided by <https://www.AssignmentExpert.com>