Hypothesis Testing: Testing a Claim about a Proportion

To test a claim about a proportion, a few requirements must be met:

- The sample observations are a simple random sample.
- The conditions for a binomial distribution are satisfied.
- $n \cdot p \geq 5$ and $n \cdot q \geq 5$

If these conditions are met, we would then define our null and alternative hypotheses, which will tell us whether a test is left, right, or two-tailed, and then calculate our test statistic.

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

For a left tailed test, we want the area to the left of our test statistic.

- On the TI-83/84, use $normalcdf(-1E99, Z_{test}, 0,1)$

For a right tailed test, we want to find the area to the right of the test statistic.

- On the TI-83/84, use $normalcdf(Z_{test}, 1E99,0,1)$

For a two tailed test, find the area beyond one of the test statistics, and multiply the value by two.

The area we calculate is our P-Value, which we compare against α to decide whether or not to reject the null hypothesis. If P-Value is greater than α, we fail to reject the null hypothesis; however if the P-Value is less than α, we reject the null hypothesis.

Alternatively, we can compare our test statistic to the critical values that form the α region. If our test statistic is lesser in magnitude than the critical value, we fail to reject the null hypothesis; however, if our test statistic is greater in magnitude than the critical value, we reject the null hypothesis.