

**Section 8-2**  
**Testing a Claim about a Proportion**

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**UNDERLYING RATIONALE FOR HYPOTHESIS TESTING**

- If, under a given observed assumption, the probability of getting the sample is very small and the observed event occurs *significantly less than* or *significantly great than* what we typically expect with that assumption, we conclude that the assumption is probably not correct.
- When testing a claim, we make an assumption (null hypothesis) that contains equality. We then compare the assumption and the sample results and we form one of the following conclusions:

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**UNDERLYING RATIONALE FOR HYPOTHESIS TESTING**

1. If the sample results can be *not* significantly low or significantly high when the assumption (null hypothesis) is true, we attribute the relatively small discrepancy between the assumption and the sample results to chance.
2. If the sample results *are* significantly low or significantly high when that assumption (null hypothesis) is true, we explain the relatively large discrepancy between the assumption and the sample by concluding that the assumption is not true.

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**ASSUMPTIONS FOR TESTING  
CLAIMS ABOUT A  
POPULATION PROPORTION  $p$**

1. The sample observations are a simple random sample.
2. The conditions for a ***binomial distribution*** are satisfied. (See Section 5-3.)
3. The conditions  $np \geq 5$  and  $nq \geq 5$  are both satisfied, so **the binomial distribution of sample proportions can be approximated by a normal distribution with  $\mu = np$  and  $\sigma = \sqrt{npq}$ .**

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**NOTATION**

$n$  = sample size or number of trials

$\hat{p} = \frac{x}{n}$  (***sample*** proportion)

$p$  = population proportion (used in the null hypothesis)

$q = 1 - p$

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**TEST STATISTIC FOR TESTING A CLAIM  
ABOUT A PROPORTION**

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

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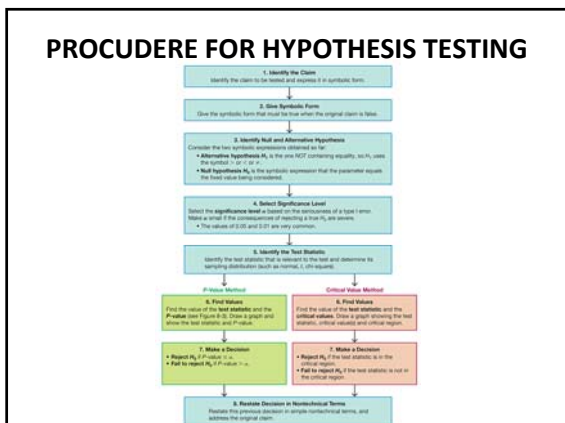
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### NOTES ABOUT THE SAMPLE PROPORTION

$\hat{p}$  is sometimes given directly.  
 48% of the voters support Candidate A.  

$$\hat{p} = 0.48$$

$\hat{p}$  must sometimes be calculated.  
 75 voters surveyed support Candidate A and 81 do not.  

$$\hat{p} = \frac{x}{n} = \frac{75}{75 + 81} = 0.48$$

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### CAUTIONS

- When the calculation of  $\hat{p}$  results in a decimal with many places, store the number on your calculator and use all the decimals when evaluating the z test Statistic.
- Large errors can result from rounding  $\hat{p}$  too much.

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**P-VALUE METHOD USING THE  
TI-83/84 CALCULATOR**

1. Press **STAT**.
2. Arrow over to **TETS**.
3. Select **5:1-PropZTest...**
4. Enter as  $p_0$  the value of  $p$  from the null hypothesis.
5. Enter the values for  $x$  (number of successes) and  $n$  (sample size).
6. Select the type of test. Select either  $\neq p_0$ ,  $< p_0$ , or  $> p_0$ . This corresponds to the alternative hypothesis.
7. Highlight **Calculate**, and press **ENTER**.

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