Lesson 12-1 Inference for a Population Proportion

If we are interested in knowing the unknown proportion *p* of a population, we use the parameter ê.



**Assumptions for inference about a proportion**

* The data are an SRS from the population of interest.
* The population is at least 10 times as large as the sample.
* For a test of H0: p = p0, the sample size n is so large that both np0 and n(1 – p0) are 10 or more. For a confidence interval, n is so large that both the count of successes nê and n(1 – ê) are 10 or more.

**Large sample inference for a population proportion**

Draw an SRS of size n from a large population with unknown proportion *p* of successes. An approximate **level C Confidence interval** for *p* is



To **test the hypothesis** H0: p = p0, compute the z statistic

**Choosing the sample size**

In order to calculate a sample size, you need to have an estimate for the value of p, called p\*. There are two ways to get p\*.

1. Conduct a pilot study or use past experience to estimate p\*
2. Use p\* = 0.5. Since the margin of error is largest when ê = 0.5, this will be a conservative estimate. It is reasonable to use this method if you believe that p is between 0.3 and 0.7.

To determine the **sample size** n which will yield a level C confidence interval for a population proportion p with a specified margin of error m, use the formula



# What Can Go Wrong?

* Make sure you use this method for **proportions**. For means, even means that are percentages, use the t test.

1) A random sample of 867 registered voters found that 546 favored Proposition A. Calculate a 95% confidence interval for the proportion of voters in the population who favor Proposition A.

2) A random sample of 1700 voters from a large population found that 1250 favored Proposition B. Test the hypothesis that that at most 70% of the voters in the population favor Proposition B.

3) Suppose you are heading a scientific polling organization. Candidate Herkimer wants you poll a group of voters to determine his popularity. And, he would like a margin of error of 2%. The question now becomes how large a sample size is needed to get a 2% margin of error? We are interested in a 95% confidence interval.