Confidence Intervals for p

Example Suppose you are trying to determine p, the proportion of students at BCIT who use an iPhone. You randomly select $n = 50$ students and determine that $x = 34$ use an iPhone.

a. What is the best point estimate of p, the population proportion of iPhone users?

b. What is the 95% confidence interval for p?

Why Does This Work?

Suppose the true proportion of iPhone users at BCIT is $p = 0.62$. (But suppose also that this information is *hidden* from us.) We randomly select $n = 50$ and determine $X =$ the number of iPhone users in the sample. Then:

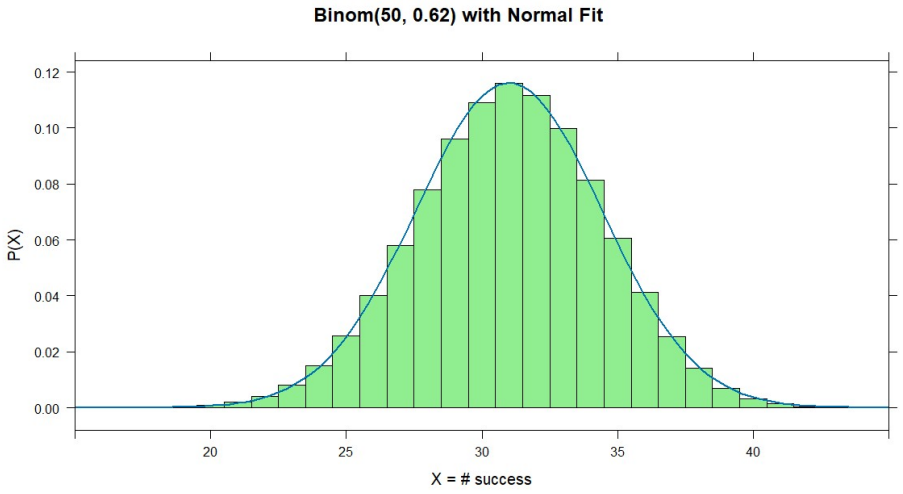
- X is a binomial variable with
  - $p = 0.62$ and
  - $q = 0.38$

- The mean and standard deviation of X are:
  - $\mu = np =$
  - $\sigma = \sqrt{npq} =$

- As a consequence of the Central Limit Theorem, the variable X is approximately *normally distributed* since:

$$np = 31 \geq 5$$

$$nq = 19 \geq 5$$



If X follows a normal distribution, then we know that there is a 95% probability that X has a Z-score between -1.96 and $+1.96$.

In other words: