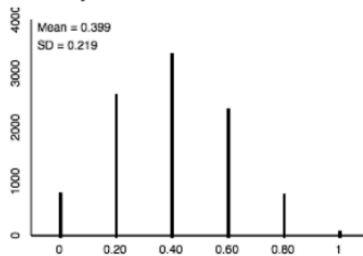


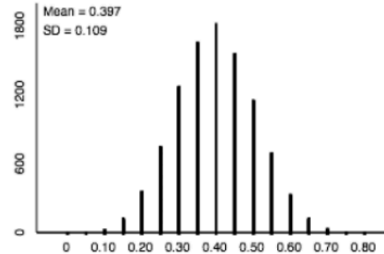
Section 7.2 – Sampling Proportions

Center, Spread & Shape of the Sampling Distribution

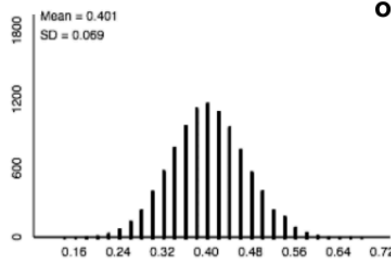
**Proportion of Red Chips in a Sample ($p = 40\%$)
 ~ the Sampling Distribution for Various
 Sample Sizes, n**



**10000 Samples
 of size $n = 5$**



**10000 Samples
 of size $n = 20$**



**10000 Samples
 of size $n = 50$**

Center –

Spread –

Shape –

How is Sample Proportion Related to Binomial Data?

Suppose we choose an SRS of size n from a population of size N with proportion p of successes. Let \hat{p} be the sample proportion of successes. Then:

Mean:

Standard Deviation:

As long as _____.

Problems:

1) About 75% of young adult Internet users (ages 18 to 29) watch on-line movies. Suppose that a sample survey contacts an SRS of 1000 young adult Internet users and calculates the proportion \hat{p} in this sample who watch online videos.

- a) What is the mean of the sampling distribution of \hat{p} ? Explain.
- b) Find the standard deviation of the sampling distribution of \hat{p} . Check that the 10% condition is satisfied.
- c) If the sample size were 9000 rather than 1000, how would the sampling distribution of \hat{p} change?

2) Suppose a large candy machine has 45% orange candies. Which is more surprising: getting a sample of 25 candies in which 32% are orange or getting a sample of 50 candies in which 32% are orange or are they equally surprising?

3) Suppose a large candy machine has 15% orange candies. Imagine taking an SRS of 25 candies from the machine and observing the sampling distribution of \hat{p} of orange candies.

- a) What is the mean of the sampling distribution of \hat{p} ?
- b) Find the standard deviation of the sampling distribution of \hat{p} . Check that the 10% condition is satisfied.
- c) If the sample size were 2500 rather than 25 how would your responses from parts (a) and (b) change?

4) A *USA Today* poll asked a random sample of 1012 U.S. adults what they do with the milk in the bowl after they have eaten the cereal. Of the respondents, 67% said that they drink it. Suppose that 70% of U.S. adults actually drink the cereal milk.

- a. Find the mean and standard deviation of the proportion \hat{p} of the sample that say they drink the cereal milk.
- b. Explain why you can use the formula for the standard deviation of \hat{p} in this setting.
- c. What sample size would be required to reduce the standard deviation of the sample proportion to one-half the value you found in part (a)?