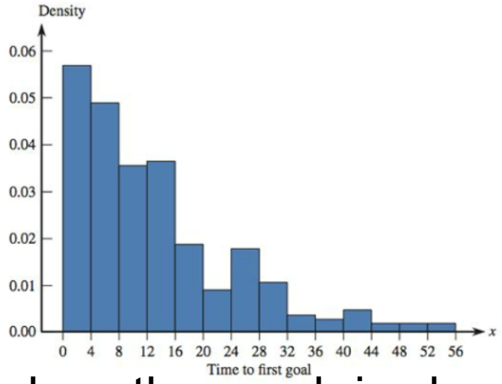
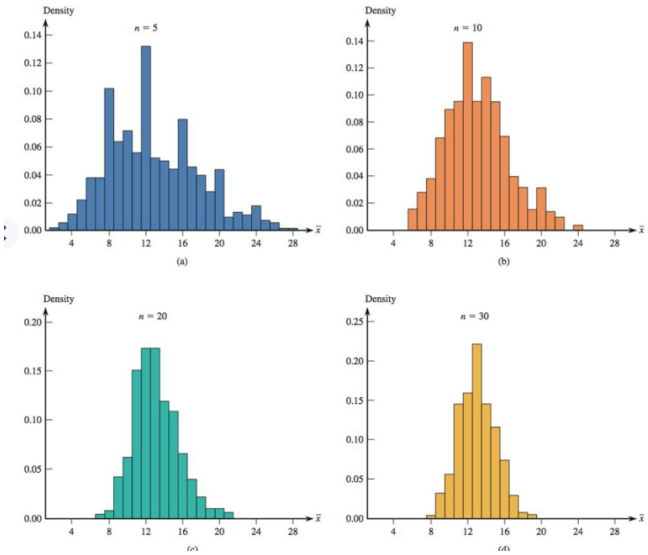
Here is a histogram of the first goal scored for the 281 regular season games from the 2005-2006 NHL season.



Notice how the graph is skewed right. We can't do our normal distribution probabilities with this graph. However, if we start randomly taking samples from this group, and graphing the averages instead of the individual numbers, we start to see this.

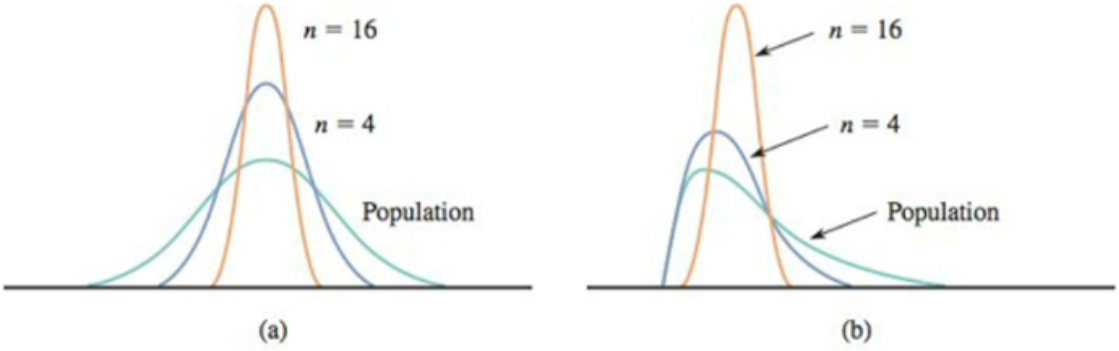


Most statisticians agree that the graph becomes sufficiently "normal" when n is greater than or equal to 30.

*If the top graph were a dart board, you would throw 5 darts, and write down those #'s...

If the graph starts normal, it ends normal, after this process.

If the graph starts as something other than normal, it ends normal after this process.



http://www.ltcconline.net/greenl/java/Statistics/clt/cltsimulation.html

The attention span of a two-year-old (and sometimes a college student) is exponentially distributed (skewed right) with a mean of about 8 minutes. Suppose we randomly survey 60 two-year-olds.

a. Draw a picture of the distribution of an individuals attention span, and plot the mean.

b. Draw a picture of the distribution of the average attention spans of 60 children, and plot the mean.

c. Why are the distributions different?

d. Any idea about which is more: the probability that the attention span of one child is less than 8 minutes, or the probability that the attention span of the average of 60 children is less than 8 minutes?

A personnel manager at a corporation must review 16 of the employees. From past experience, she found that the review takes her about 4 hours each to do with a population standard deviation of 1.2 hours. X will represent the random variable of an individual, which is normally distributed. X-bar will represent the mean of the 16 employees.

1. What is the mean and standard deviation of the random variable, x?

2. What is the mean and standard deviation of the mean of the sample mean?

3. What's the shape of the distribution of the random variable, x?

4. What's the shape of the distribution of the mean of the sample mean? Why?

5. Find the probability that one review will take 3.5 to 4.25 hours. Draw and label a diagram.

6. Find the probability that the mean of the sample mean will take between 3.5 to 4.25 hours. Draw and label a diagram.

7. Find the 95th percentile for the mean time to complete 16 employee's reviews.

Salaries for teachers in a particular school district are skewed to the right, with a mean of $44,000 and a standard deviation of $6,500.

a. Draw the distribution for an individual teacher, and mark the mean on the graph.

b. Draw the distribution for the sample mean of 30 teachers and mark the mean on the graph.

c. Why are the graphs different?

d. Can you find the 90th percentile for an individual teacher salary?

e. Find the 90th percentile for the average of 30 teacher salaries.

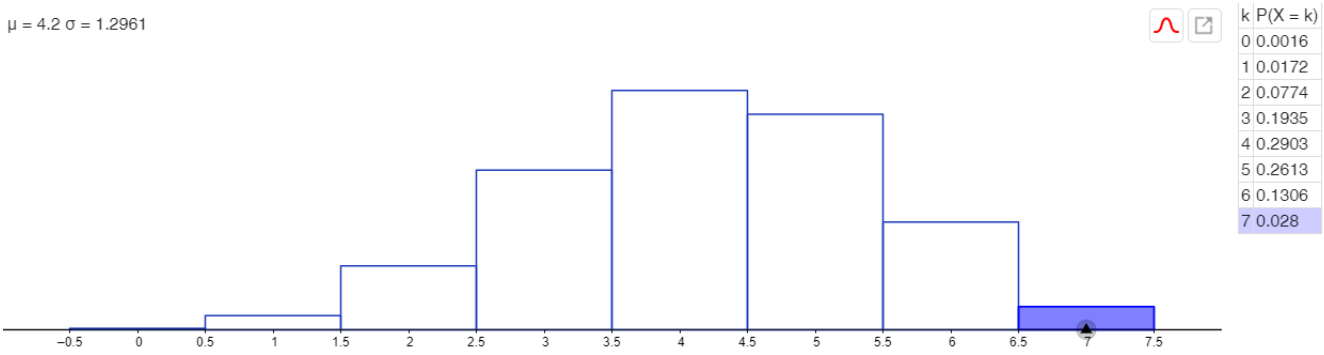
Salaries for teachers in a particular school district are normally distributed, with a mean of $44,000 and a standard deviation of $6,500.

a. Draw the distribution for an individual teacher, and mark the mean on the graph.

b. Draw the distribution for the sample mean of 30 teachers and mark the mean on the graph.

c. Compare the probability of one teacher making over $50,000 vs. the average of 30 teachers making over $50,000.

Suppose that a random variable x, has the following binomial distribution, n=7, p=.6



k	P(X = k)
0	0.0016
1	0.0172
2	0.0774
3	0.1935
4	0.2903
5	0.2613
6	0.1306
7	0.028

a. How would you describe the distribution for the random variable x?

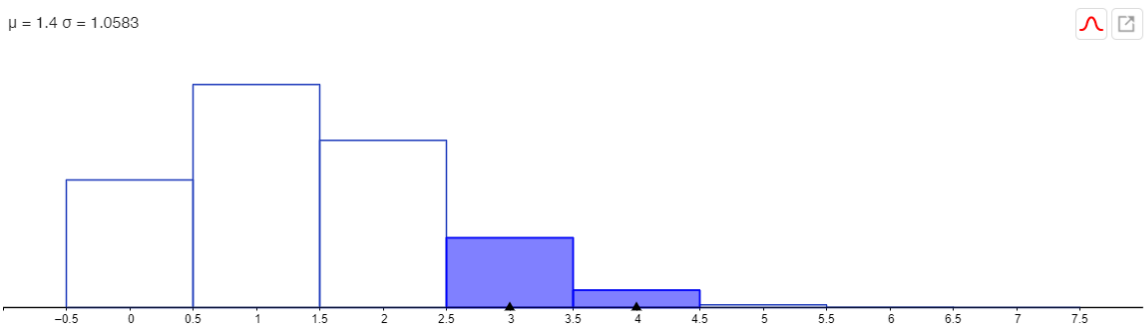
b. State the shape of the sampling distribution of the sample mean?

c. What is the mean and s.d. of the sample distribution?

d. What is the mean and s.d. of the sampling distribution of the sample mean?

e. What has a higher probability: An individual that is one or less, or a mean of the group of 20 is one or less?

f. What has a higher probability: An individual that is at lease two, or a mean of the group of 30 is at least 2?



k	P(X = k)
0	0.2097
1	0.367
2	0.2753
3	0.1147
4	0.0287
5	0.0043
6	0.0004
7	0

The above distribution is a binomial distribution that is skewed right.

a. What is the mean and s.d. of the sample distribution?

b. What is the mean and s.d. of the sampling distribution of the sample mean?

c. What has a higher probability: An individual that is 2 or less, or a mean of the group of 13 is 2 or less?

d. What has a higher probability: An individual that is at least 4, or a mean of the group of 17 is at least 4?