

**Statistics 300:
Elementary Statistics
Section 6-5**

Central Limit Theorem

- **Given: X has mean = m and standard deviation = s**
- **For a specified sample size “n”**
- **The number of possible samples of size n is usually very large**

Central Limit Theorem

- **The number of possible samples of size n is usually very large**
- **Example: Population $N = 100$ and sample size $n = 10$.**
- **The number of possible samples is ${}_{100}C_{10} = 1.73 * 10^{13}$**

Central Limit Theorem

- Each of the possible samples has its own sample mean
- The collection (set or population) of possible sample means has a mean and standard deviation
- The mean = m and the standard deviation = s/\sqrt{n}

Central Limit Theorem

- Furthermore,
- If $n > 30$ or if $X \sim N(m, s)$ then
- The distribution of all possible sample means is approximately a normal distribution

The Mean of a Random Sample has the distribution below if $n > 30$ or the “parent population” is “normal”

$$\bar{X} \sim N\left(m, \frac{s}{\sqrt{n}}\right)$$

Weights of oranges have a mean weight of 34.2 grams and a standard deviation of 6.4 grams.

If 12 oranges are selected at random, what is the probability the average weight of the 12 oranges will be greater than 30 g?
