

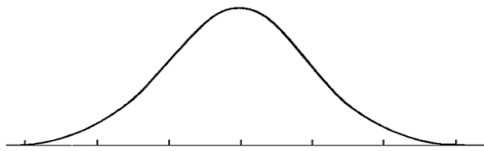
Section 7.2: Sampling Distributions of Sample Means

Example 1: For a certain type of carpet, the number of flaws per square yard varies with a mean of 1.6 and a standard deviation of 1.2. A quality control inspector samples 200 randomly chosen square yards of the carpet, and calculates the mean number of flaws per square yard.

1. What is the population?
2. Identify the symbol that goes with each of the numbers in the situation (1.6, 1.2, 200).
3. The sampling distribution of the sample mean is approximately normal, sometimes written as follows (you fill in the blanks):

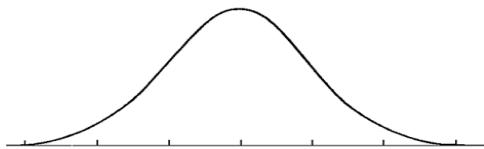
$$\bar{x} \approx N(\underline{\hspace{2cm}}, \underline{\hspace{2cm}})$$

4. Sketch the sampling distribution (a.k.a., the \bar{x} -bar distribution) labeling the mean and three standard errors in each direction.



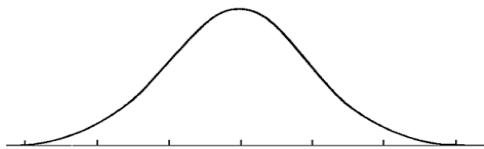
\bar{x} distribution

5. Use the empirical rule to answer the following. If you repeatedly took random samples of 200 square yards of carpet, then
 - a. About 68% of the samples have \bar{x} between _____ and _____.
 - b. About 95% of the samples have \bar{x} between _____ and _____.
 - c. Almost all of the samples have \bar{x} between _____ and _____.
6. Use *normalcdf* to answer the following.
 - a. What proportion of all possible samples have $\bar{x} \geq 1.79$? That is, find the probability that a random sample of 200 square yards of carpet will have a mean of 1.79 or more. (Sketch it, then find it using *normalcdf*(1.79, 100000, _____, _____).)



\bar{x} distribution

- b. Find the probability that a random sample of size 200 will have a mean between 1.48 and 1.63. (Sketch it, then find it using *normalcdf*(1.48, 1.63, _____, _____).)



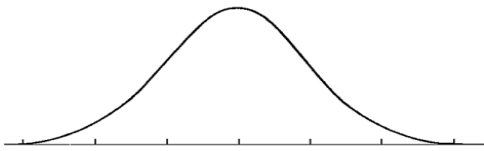
\bar{x} distribution

Example 2. A World Health Organization study shows that in Canada the systolic blood pressure readings are normally distributed with mean of 121 and a standard deviation of 16. You plan to randomly sample 25 Canadian citizens and take their blood pressure.

1. What is the population?
2. Identify the symbol that goes with each of the numbers in the situation (121, 16, 25).
3. The sampling distribution of the sample mean is approximately normal, sometimes written as follows (you fill in the blanks):

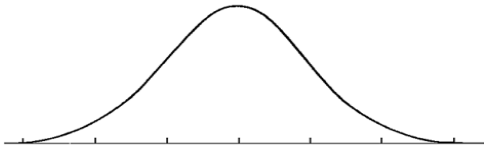
$$\bar{x} \approx N(\underline{\hspace{2cm}}, \underline{\hspace{2cm}})$$

4. Sketch the sampling distribution (a.k.a., the \bar{x} -bar distribution) labeling the mean and three standard errors in each direction.



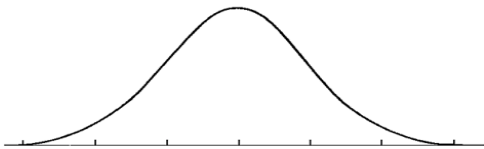
\bar{x} distribution

5. Use the empirical rule to answer the following. If you repeatedly took random samples of 75 citizens, then
 - a. About 68% of the samples have \bar{x} between _____ and _____.
 - b. About 95% of the samples have \bar{x} between _____ and _____.
 - c. Almost all of the samples have \bar{x} between _____ and _____.
6. Use *normalcdf* to answer the following.
 - a. Find the probability that a random sample of 25 citizens will have a mean less than 119.3. (Sketch it, then find it using *normalcdf*.)



\bar{x} distribution

- b. You find that a particular random sample has mean 124.8. What proportion of all the possible samples have a mean that far or further away (in either direction) from the center of the sampling distribution?



\bar{x} distribution