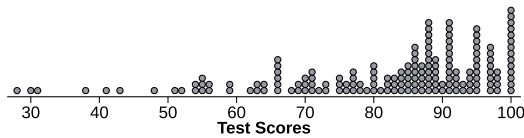


1. An AP Statistics teacher recently gave a test to all 167 of her students. Here is the dotplot of the scores and the summary statistics.



Summary Statistics		
n	Mean	SD
167	81.92	15.62

- a. Describe the population distribution.
- b. Suppose the teacher selects random samples of 5 test scores and calculates the average of each sample. What is the shape of the sampling distribution for the sample means? Explain.
- c. Suppose the teacher selects random samples of 35 test scores and calculates the average of each sample. What is the shape of the sampling distribution for the sample means? Explain.

2. Amazon Web Services (AWS) is known for having low latency times for their servers, which is the amount of time it takes data packets to travel from one server to another. Suppose that one AWS customer from California recorded the latency times for one month. The distribution of these latency times is strongly skewed to the right, with a mean of 141.8 milliseconds and a standard deviation of 69.0 milliseconds.
- Suppose the AWS customer randomly selects 50 of these latency times and then calculates the mean of the sample ($\bar{x}$). What is the shape of the sampling distribution of $\bar{x}$? Justify.
 - What are the mean and standard deviation of the sampling distribution of $\bar{x}$?
 - For a random sample of 50 latency times, what is the probability that the mean would be less than 130 milliseconds.
 - Suppose the AWS customer had selected a random sample of 10 latency times instead of 50. Describe how this change would impact the following aspects of the sampling distribution of $\bar{x}$.

Shape:

Center (mean):

Variability (standard deviation):

3. According to the Bureau of Labor Statistics, the distribution of salaries for management positions is skewed to the right with a mean of \$117,000 and a standard deviation of \$37,000. Suppose we select a random sample of 40 adults in a management position and calculate their average salary.
- Describe the sampling distribution of the sample mean.
 - Calculate the probability that a random sample of 40 adults in a management position will have an average salary less than \$100,000.
 - A frustrated employee at a large company believes that people in management positions at the company are being underpaid. The employee selected a random sample of 40 management position employees from the company and found a mean salary of \$100,000. Does this result provide convincing statistical evidence that the mean salary for management positions at this large company is lower than the national average?
4. The distribution of the number of text messages received per day by all students in a school is skewed to the right with a mean of 25.3 text messages and a standard deviation of 11.2 text messages. The 1st hour AP Statistics class creates a simulated sampling distribution by repeatedly taking samples of size 16 and calculating the average number of text messages received for each sample. The 2nd hour AP Statistics class creates a simulated sampling distribution by repeatedly taking samples of size 64 and calculating the average number of text messages received for each sample.
- Compare the shape, center, and variability of the sampling distributions created by the two AP Statistics classes.
 - In which sampling distribution would you be more likely to observe a sample mean greater than 30 text messages. Explain.

5. Before Debbie begins pumping gasoline into her car, she predicts the number of gallons she'll need to fill up. After pumping, she records the actual amount of gasoline needed and calculates the difference (actual gallons – predicted gallons). The distribution of the differences is skewed right with a mean of 1.7 gallons and a standard deviation of 2 gallons. She wants to calculate the probability that the mean difference is greater than 3 for a random sample of size 100. Which of the following describes the sampling distribution of the sample mean difference?
- A) Approximately normal with a mean of 1.7 gallons and a standard deviation of 2 gallons.
 - B) Approximately normal with a mean of 1.7 gallons and a standard deviation of 0.2 gallons.
 - C) Skewed right with a mean of 1.7 gallons and a standard deviation of 0.2 gallons.
 - D) Skewed right with a mean of 1.7 gallons and a standard deviation of 2 gallons.
6. Jeremy is the owner of a company that has thousands of monthly expenses that are all paid for with online orders. The company spends an average of \$1,120 per order with a standard deviation of \$700. Over the next 25 orders, he wants to reduce the mean order amount spent to \$400 or less. What is the z -score that corresponds to this target mean?
- A) $z = -5.14$
 - B) $z = -1.04$
 - C) $z = -25.71$
 - D) $z = -136.07$