Lesson #36 · Topic 4A · Practice

Name _____

1. Keya has completed all 25 quizzes in science class this year. Her mean score on the quizzes is 87.5 and the standard deviation is 6.7.

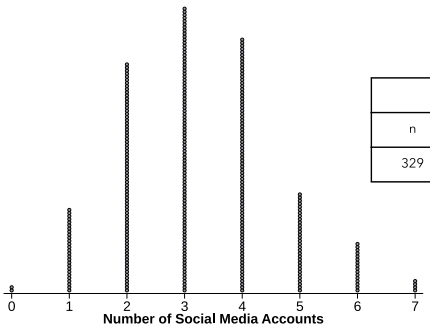
   a. Are 87.5 and 6.7 statistics or parameters? Use correct symbols for each.

   b. Describe how Keya could create the sampling distribution for the sample mean by selecting samples of size 2.

   c. What are the mean and standard deviation of the sampling distribution described in part (b)?

   d. What condition must be met to use the formula for standard deviation in part (c)? Check the condition.

2. AP Statistics teachers conducted a census of all AP Statistics students at their high school to learn about their social media usage. One survey question asked “How many different social media accounts do you have?” A dotplot and summary statistics of their responses are shown.



Summary Statistics		
n	Mean	SD
329	3.23	1.35

a. Describe the population distribution.

b. One random sample of 15 responses is selected. The dotplot and summary statistics of the results are shown. Describe the distribution of sample data.

Summary Statistics		
n	Mean	SD
15	2.53	1.3

c. Suppose the teachers selects every possible sample of size 15 and record the average number of social media accounts for each sample. What is the name of this type of distribution?

d. Describe the distribution in part (c).

3. A corporation offers bonus donations to Girl Scout troops in a certain state based on cookie sales. To determine a troop's eligibility for the bonus, one member is randomly selected from the troop and her total number of boxes of cookies sold is counted. For Girl Scout Troop A, the number of boxes sold per member is approximately normally distributed with mean 25 boxes and standard deviation 4.6 boxes.

   a. The troop receives the bonus if the randomly selected member sold more than 30 boxes. What is the approximate probability that Girl Scout Troop A will receive a bonus?

   b. The corporation suggests a new plan: randomly selecting three Girl Scouts instead of one, and using their mean number of boxes sold to determine eligibility for the bonus. The troop would receive the bonus if the mean number of boxes sold is greater than 30. Would Troop A be more likely, less likely, or equally likely to receive the bonus under this new plan? Justify your answer.

4. For a state exam, fifth grade students receive scores from 1 to 5. The scores of all 100 fifth graders at a small school are approximately normally distributed with mean 3.2 and standard deviation 0.5.

   a. The principal plans to select a random sample of students and calculate their mean score. What is the largest sample size possible if $\frac{\sigma}{\sqrt{n}}$ is used to calculate the standard deviation of the sampling distribution of the sample mean? Explain.

   b. Suppose the principal randomly selects 8 students and calculates their mean score ($\bar{x}$). Find the mean and standard deviation of the sampling distribution of $\bar{x}$.

   c. If instead the principal randomly selects 4 students and calculates their mean score ($\bar{x}$), how does this change the sampling distribution of $\bar{x}$?

5. Average daily temperatures for March in Charlotte, North Carolina follow an approximately normal distribution with a mean of 52.1°F and a standard deviation of 10.5°F.

a. Calculate the probability that a randomly selected day in March will have an average temperature between 45°F and 60°F.

b. From the weather records of the past 100 years, Dean selects a random sample of five days in March and calculates the mean of the average daily temperatures for the sample, $\bar{x}$. Describe the sampling distribution of $\bar{x}$.

c. Calculate the probability that a random sample of 5 days in March will have a sample mean temperature less than 40°F.

6. The distribution of PSAT scores for students at a large high school has a mean of 1020 and a standard deviation of 110. Let $\bar{x}$ represent the mean PSAT score for a random sample of 30 students at this high school. Which of the following calculations will give the approximate probability that $\bar{x}$ is more than 1150?

A) $P\left(z > \dfrac{1150 - 1020}{\dfrac{110}{\sqrt{30}}}\right)$

B) $P\left(z > \dfrac{1150 - 1020}{110}\right)$

C) $P\left(z > \dfrac{1020 - 1150}{110}\right)$

D) $P\left(z > \dfrac{1020 - 1150}{\dfrac{110}{\sqrt{30}}}\right)$

7. Suppose the sampling distribution of a sample mean for samples of size 25 is approximately normal with a mean of 100 and a standard deviation of 10. Which of the following is the population standard deviation?

A) 2

B) 4

C) 10

D) 50