Lesson 7: Probability Calculations Involving a Mean Response

Preparation

Directions: Please fill in Part I as you study the Reading Assignment. Once you finish the reading, complete the questions on Part II. You may use your notes, the key, and the help videos. Be sure to take this completed assignment to your group meeting where you can ask and help answer questions on this assignment.

Problems

Part I: Use the information in the reading assignment to complete these questions.

1. One of two conditions must be satisfied in order for the distribution of sample means to be normally distributed. What are the two conditions?
2. What is the z-score formula for a sample mean that is normally distributed?
3. Suppose a normally distributed population has a mean $\mu = 10$ and a population standard deviation $\sigma = 5$.
   a. What is the probability a randomly selected individual observation is between 5 and 15?
   b. What is the 40^{th} percentile for this population?
   c. What is the z-score for an observation of 18.5?
   d. What is the probability that an individual observation is greater than 12?
   e. What is the probability that an individual observation is less than 8 or greater than 12?

Part II:

Suppose Pear Computing sold an average of $\mu = 45$ pFones per minute in 2011 (yes, that means they sold 23,652,000 pFones in 2011) with a standard deviation of $\sigma = 10$, and they looked at their pFone sales data and determined that they are normally distributed.

4. Samples of size $n = 4$ are taken from the normally distributed 2011 sales data. What is the shape of the distribution of $\bar{x}$?
5. Samples of size $n = 40$ are taken from the normally distributed 2011 sales data. What is the shape of the distribution of $\bar{x}$?
6. A sample of size $n = 4$ is taken from the normally distributed 2011 sales data. What is the probability that the observed $\bar{x} < 40$?
7. A sample of size $n = 4$ is taken from the normally distributed 2011 sales data. What is the probability that the observed $\bar{x}$ is greater than 35 and less than 55?
8. A sample of size $n = 25$ is taken from the normally distributed 2011 sales data. What is the probability that $\bar{x}$ is greater than 41 and less than 49?
9. A sample of size $n = 25$ is taken from the normally distributed 2011 sales data. What is the probability that the observed $\bar{x}$ is greater than 50?

Pear Computing sold an average of $\mu = 40$ pFones per minute in 2010 with a standard deviation of $\sigma = 12$, and they looked at their pFone sales data and determined that the distribution is right skewed.

10. Samples of size $n = 4$ are taken from the right skewed 2010 pFone sales data. What is the shape of the distribution of $\bar{x}$?

11. Samples of size $n = 40$ are taken from the right skewed 2010 pFone sales data. What is the shape of the distribution of $\bar{x}$?

12. Is there a theorem that justifies your answer to question 11? What is the name of the theorem?

13. A sample of size $n = 4$ is taken from the right skewed 2010 pFone sales data and you want to know the probability that the observed $\bar{x} < 35$. Can you compute this probability using the normal probability applet with the information you have? Why?

14. A sample of size $n = 36$ is taken from the right skewed 2010 pFone sales data. What is the probability that the observed $\bar{x}$ is greater than 36.5?

15. A sample of size $n = 36$ is taken from the right skewed 2010 pFone sales data. What is the probability that the observed $\bar{x}$ is between 37.5 and 42.5?