Unit 07-06 - Sample Quiz: Central Limit Theorem

Multiple Choice
Identify the choice that best completes the statement or answers the question.

1. The graph at the right show the frequency distribution of a population with a population mean of 4 and a population standard deviation of 2.5.

   If samples of size 25 ($n = 25$) were taken from the population what would be the mean of the sample means ($\mu_x$)?

   - a. 0.8
   - b. 1.5
   - c. 4
   - d. 6.5

2. The graph at the right show the frequency distribution of a population with a population mean of 2.5 and a population standard deviation of 3.

   If samples of size 36 ($n = 36$) were taken from the population what would be the standard deviation of the sample means ($\sigma_x$)?

   - a. $0.08\sqrt{3}$
   - b. 0.500
   - c. 1.200
   - d. 3.000
3. The graph at the right show the frequency distribution of a population with a population mean of 2.5 and a population standard deviation of 3.

If samples of size 25 \((n = 25)\) were taken from the population which graph would most likely be a good representation of the distribution of the sample means?

- a. 
- b. 
- c. 
- d. 

4. A high school student spends an average of 6 hours \((\mu = 6)\) on their phone a day with a standard deviation of 2.5 hours \((\sigma = 2.5)\).

If samples of size 16 \((n = 16)\) were taken from the population what would be the mean of the sample means \((\mu_x)\)?

- a. 1.5  
- b. 2.5  
- c. 4  
- d. 6
5. Use the central limit theorem if possible. For a sample of $n = 36$, find the probability of a sample mean being greater than 43 given $\mu = 42$ and $\sigma = 12$. The population is also normally distributed.

(Hint: First determine $\mu_x$ and $\sigma_x$ and use those values to find $z_x$)

a. 0.3085  
   b. 0.4668  
   c. 0.5332  
   d. 0.6915

6. Use the central limit theorem if possible. For a sample of $n = 9$, find the probability of a sample mean being less than 7 given $\mu = 8$ and $\sigma = 3$. The population is not normally distributed.

a. 0.1587  
   b. 0.3694  
   c. 0.8413  
   d. Cannot be determined because the sample size is too small.

7. At a restaurant near the high school, the restaurant manager has determined that each customer on average spends $9.10 ($\mu = 9.10$) with a standard deviation of $3.00 ($\sigma = 3.00$). The customer data was normally distributed.

A group of 4 friends ($n = 4$) went to the restaurant together and one of the friends bought lunch for entire group. What is the probability that the total bill will be more than $40?

(Hint: This suggests finding the probability that the sample mean would be greater than $10.00$.)

a. 12.8%  
   b. 27.4%  
   c. 38.2%  
   d. 42.1%
8. The length of pregnancies are normally distributed with a mean of 268 days ($\mu = 268$) and a standard deviation of 15 days ($\sigma = 15$).

A group of 36 pregnant women ($n = 36$) were in a parenting class together. What is the probability that the average pregnancy for the women lasted longer than 270 days?

a. 21.2%  
   b. 28.8%  
   c. 55.2%  
   d. 78.8%