

$\bar{X}$

Answers

1. A sample of size $n=400$ is randomly selected from a non-normal population with a mean $\mu=240$ and standard deviation $\sigma=40$.
 - a. Find $P(\bar{X} \geq 235)$
 - b. Find $P(236 < \bar{X} < 244)$
 - c. Find $P(\bar{X} < 245)$
2. At a certain bank, the mean checking account balance is $\mu=\$1000$ and the population standard deviation is $\sigma=\$144$. (Assume the distribution is normal).
 - a. What is the probability that the sample mean of 64 randomly chosen checking account balances is between \$982 and \$1018?
 - b. What is the probability that a randomly selected individual checking account is between \$982 and \$1018?
 - c. What is the probability that the sample mean of 64 randomly chosen checking account balances is between \$964 and \$1036?
 - d. What is the probability that a randomly selected individual checking account is between \$964 and \$1036?
3. Assume the average city in the US has 45,200 residents and the population standard deviation is 33,800. Suppose you randomly sample 49 American cities.
 - a. Describe the population you are sampling from. Do you think the distribution of city sizes would be normal?
 - b. Calculate the probability the sample mean city size is greater than 52,000.
 - c. Calculate the probability the sample mean city size is less than 48,000.
 - d. Suppose that instead of randomly sampling across all American cities, you purposely selected only among cities in California. How would this change the probabilities calculated in parts *b* and *c*?
 - e. Given the information we have, explain why we cannot calculate the probability that an individual randomly selected city would be within a certain size range.
4. In 2002, the population mean yearly tuition at state universities in the US was \$4,260. Assume the population standard deviation is \$900.
 - a. Calculate the probability that a sample of 36 state universities has a mean tuition within \$200 of the population mean.
 - b. Calculate the probability that a sample of 100 state universities has a mean tuition within \$200 of the population mean.
 - c. Explain why the probability calculated in part *b* is larger than the probability calculated in part *a*.

5. Suppose the population mean number of books at non-academic libraries in the US is 35,500 books with a population standard deviation of 15,000 books. Assume you randomly sample 64 libraries.
- Describe the population of the problem.
 - Calculate the probability of obtaining a sample mean number of books greater than 40,000.
 - Calculate the probability of obtaining a sample mean number of books greater than 33,625.
 - $P(\bar{X} > 50,000) \approx 0$. Verify that this is true and explain what it means. Does this imply that there is no public library in the US with more than 50,000 books?
 - Explain why the population of library sizes (in terms of number of books) is probably not normally distributed.