

7.2E: The Central Limit Theorem for Sample Means (Exercises)

Use the following information to answer the next six exercises: Yoonie is a personnel manager in a large corporation. Each month she must review 16 of the employees. From past experience, she has found that the reviews take her approximately four hours each to do with a population standard deviation of 1.2 hours. Let X be the random variable representing the time it takes her to complete one review. Assume X is normally distributed. Let \bar{X} be the random variable representing the mean time to complete the 16 reviews. Assume that the 16 reviews represent a random set of reviews.

Exercise 7.2E.5

What is the mean, standard deviation, and sample size?

Answer

mean = 4 hours; standard deviation = 1.2 hours; sample size = 16

Exercise 7.2E.6

Complete the distributions.

1. $X \sim \text{_____}(\text{_____,} \text{_____})$
2. $\bar{X} \sim \text{_____}(\text{_____,} \text{_____})$

Exercise 7.2.7

Find the probability that **one** review will take Yoonie from 3.5 to 4.25 hours. Sketch the graph, labeling and scaling the horizontal axis. Shade the region corresponding to the probability.


1.  This is a frequency curve for a normal distribution. It shows a single peak in the center with the curve tapering down to the horizontal axis on each side. The distribution is symmetrical. The horizontal axis represents the random variable X .

Figure 7.2.2.

2. $P(\text{_____} < x < \text{_____}) = \text{_____}$

Answer

1. Check student's solution.
2. 3.5, 4.25, 0.2441

Exercise 7.2.8

Find the probability that the **mean** of a month's reviews will take Yoonie from 3.5 to 4.25 hrs. Sketch the graph, labeling and scaling the horizontal axis. Shade the region corresponding to the probability.


1.  This is a frequency curve for a normal distribution. It shows a single peak in the center with the curve tapering down to the horizontal axis on each side. The distribution is symmetrical. The horizontal axis represents the random variable X .

Figure 7.2.3.

2. $P(\text{_____}) = \text{_____}$

Exercise 7.2.9

What causes the probabilities in Exercise and Exercise to be different?

Answer

The fact that the two distributions are different accounts for the different probabilities.

Exercise 7.2.10

Find the 95th percentile for the mean time to complete one month's reviews. Sketch the graph.


- a.  This is a frequency curve for a normal distribution. It shows a single peak in the center with the curve tapering down to the horizontal axis on each side. The distribution is symmetrical. The horizontal axis represents the random variable X .

Figure 7.2.4.

- b. The 95th Percentile = _____

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