

7.9: Practice

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.

1.

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

2.

Complete the distributions.

1. $X \sim \text{____}(\text{____}, \text{____})$

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

3.

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.


 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 7.16

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

4.

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.


 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 7.17

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

5.

What causes the probabilities in Exercise 7.3 and Exercise 7.4 to be different?

6.

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


 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 7.18

2. The 95th Percentile = ____

Use the following information to answer the next four exercises: An unknown distribution has a mean of 80 and a standard deviation of 12. A sample size of 95 is drawn randomly from the population.

7.

Find the probability that the sum of the 95 values is greater than 7,650.

8.

Find the probability that the sum of the 95 values is less than 7,400.

9.

Find the sum that is two standard deviations above the mean of the sums.

10.

Find the sum that is 1.5 standard deviations below the mean of the sums.

Use the following information to answer the next five exercises: The distribution of results from a cholesterol test has a mean of 180 and a standard deviation of 20. A sample size of 40 is drawn randomly.

11.

Find the probability that the sum of the 40 values is greater than 7,500.

12.

Find the probability that the sum of the 40 values is less than 7,000.

13.

Find the sum that is one standard deviation above the mean of the sums.

14.

Find the sum that is 1.5 standard deviations below the mean of the sums.

15.

Find the percentage of sums between 1.5 standard deviations below the mean of the sums and one standard deviation above the mean of the sums.

Use the following information to answer the next six exercises: A researcher measures the amount of sugar in several cans of the same soda. The mean is 39.01 with a standard deviation of 0.5. The researcher randomly selects a sample of 100.

16.

Find the probability that the sum of the 100 values is greater than 3,910.

17.

Find the probability that the sum of the 100 values is less than 3,900.

18.

Find the probability that the sum of the 100 values falls between the numbers you found in Exercise 7.16 and Exercise 7.17.

19.

Find the sum with a z-score of -2.5 .

20.

Find the sum with a z-score of 0.5 .

21.

Find the probability that the sums will fall between the z-scores -2 and 1 .

Use the following information to answer the next four exercises: An unknown distribution has a mean 12 and a standard deviation of one. A sample size of 25 is taken. Let X = the object of interest.

22.

What is the mean of ΣX ?

23.

What is the standard deviation of ΣX ?

24.

What is $P(\Sigma x = 290)$?

25.

What is $P(\Sigma x > 290)$?

26.

True or False: only the sums of normal distributions are also normal distributions.

27.

In order for the sums of a distribution to approach a normal distribution, what must be true?

28.

What three things must you know about a distribution to find the probability of sums?

29.

An unknown distribution has a mean of 25 and a standard deviation of six. Let X = one object from this distribution. What is the sample size if the standard deviation of ΣX is 42?

30.

An unknown distribution has a mean of 19 and a standard deviation of 20. Let X = the object of interest. What is the sample size if the mean of ΣX is 15,200?

Use the following information to answer the next three exercises. A market researcher analyzes how many electronics devices customers buy in a single purchase. The distribution has a mean of three with a standard deviation of 0.7. They sample 400 customers.

31.

What is the z-score for $\Sigma x = 840$?

32.

What is the z-score for $\Sigma x = 1,186$?

33.

What is $P(\Sigma x < 1,186)$?

Use the following information to answer the next three exercises: An unknown distribution has a mean of 100, a standard deviation of 100, and a sample size of 100. Let X = one object of interest.

34.

What is the mean of ΣX ?

35.

What is the standard deviation of ΣX ?

36.

What is $P(\Sigma x > 9,000)$?

Use the following information to answer the next ten exercises: A manufacturer produces 25-pound lifting weights. The lowest actual weight is 24 pounds, and the highest is 26 pounds. Each weight is equally likely so the distribution of weights is uniform. A sample of 100 weights is taken.

37.

1. What is the distribution for the weights of one 25-pound lifting weight? What is the mean and standard deviation?
2. What is the distribution for the mean weight of 100 25-pound lifting weights?
3. Find the probability that the mean actual weight for the 100 weights is less than 24.9.

38.

Draw the graph from [Exercise 7.37](#)

39.

Find the probability that the mean actual weight for the 100 weights is greater than 25.2.

40.

Draw the graph from Exercise 7.39

41.

Find the 90th percentile for the mean weight for the 100 weights.

42.

Draw the graph from Exercise 7.41

43.

1. What is the distribution for the sum of the weights of 100 25-pound lifting weights?
2. Find $P(\Sigma x < 2,450)$.

44.

Draw the graph from Exercise 7.43

45.

Find the 90th percentile for the total weight of the 100 weights.

46.

Draw the graph from Exercise 7.45

Use the following information to answer the next five exercises: The length of time a particular smartphone's battery lasts follows an exponential distribution with a mean of ten months. A sample of 64 of these smartphones is taken.

47.

1. What is the standard deviation?
2. What is the parameter m ?

48.

What is the distribution for the length of time one battery lasts?

49.

What is the distribution for the mean length of time 64 batteries last?

50.

What is the distribution for the total length of time 64 batteries last?

51.

Find the probability that the sample mean is between seven and 11.

52.

Find the 80th percentile for the total length of time 64 batteries last.

53.

Find the *IQR* for the mean amount of time 64 batteries last.

54.

Find the middle 80% for the total amount of time 64 batteries last.

Use the following information to answer the next eight exercises: A uniform distribution has a minimum of six and a maximum of ten. A sample of 50 is taken.

55.

Find $P(\Sigma x > 420)$.

56.

Find the 90th percentile for the sums.

57.

Find the 15th percentile for the sums.

58.

Find the first quartile for the sums.

59.

Find the third quartile for the sums.

60.

Find the 80th percentile for the sums.

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