6.8: Practice

1.

A bottle of water contains 12.05 fluid ounces with a standard deviation of 0.01 ounces. Define the random variable X in words. X = _____.

2.

A normal distribution has a mean of 61 and a standard deviation of 15. What is the median?

3.

$X \sim N(1, 2)$

σ = _____

4.

A company manufactures rubber balls. The mean diameter of a ball is 12 cm with a standard deviation of 0.2 cm. Define the random variable X in words. X = _____.

5.

$X \sim N(-4, 1)$

What is the median?

6.

$X \sim N(3, 5)$

σ = _____

7.

$X \sim N(-2, 1)$

μ = _____

8.

What does a z-score measure?

9.

What does standardizing a normal distribution do to the mean?

10.

Is $X \sim N(0, 1)$ a standardized normal distribution? Why or why not?

11.

What is the z-score of $x = 12$, if it is two standard deviations to the right of the mean?

12.

What is the z-score of $x = 9$, if it is 1.5 standard deviations to the left of the mean?

13.

What is the z-score of $x = -2$, if it is 2.78 standard deviations to the right of the mean?

14.

What is the z-score of $x = 7$, if it is 0.133 standard deviations to the left of the mean?

15.

Suppose $X \sim N(2, 6)$. What value of x has a z-score of three?

16.

Suppose $X \sim N(8, 1)$. What value of x has a z-score of –2.25?

17.

Suppose $X \sim N(9, 5)$. What value of x has a z-score of –0.5?

18.

Suppose $X \sim N(2, 3)$. What value of x has a z-score of –0.67?

19.

Suppose $X \sim N(4, 2)$. What value of x is 1.5 standard deviations to the left of the mean?

20.

Suppose $X \sim N(4, 2)$. What value of x is two standard deviations to the right of the mean?

21.

Suppose $X \sim N(8, 9)$. What value of x is 0.67 standard deviations to the left of the mean?

22.

Suppose $X \sim N(–1, 2)$. What is the z-score of $x = 2$?

23.

Suppose $X \sim N(12, 6)$. What is the z-score of $x = 2$?

24.

Suppose $X \sim N(9, 3)$. What is the z-score of $x = 9$?

25.

Suppose a normal distribution has a mean of six and a standard deviation of 1.5. What is the z-score of $x = 5.5$?

26.

In a normal distribution, $x = 5$ and $z = –1.25$. This tells you that $x = 5$ is ____ standard deviations to the ____ (right or left) of the mean.

27.

In a normal distribution, $x = 3$ and $z = 0.67$. This tells you that $x = 3$ is ____ standard deviations to the ____ (right or left) of the mean.

28.

In a normal distribution, $x = –2$ and $z = 6$. This tells you that $x = –2$ is ____ standard deviations to the ____ (right or left) of the mean.

29.

In a normal distribution, $x = –5$ and $z = –3.14$. This tells you that $x = –5$ is ____ standard deviations to the ____ (right or left) of the mean.

30.

In a normal distribution, $x = 6$ and $z = –1.7$. This tells you that $x = 6$ is ____ standard deviations to the ____ (right or left) of the mean.

31.

About what percent of x values from a normal distribution lie within one standard deviation (left and right) of the mean of that distribution?

32.

About what percent of the x values from a normal distribution lie within two standard deviations (left and right) of the mean of that distribution?

33.

About what percent of x values lie between the second and third standard deviations (both sides)?

34.

Suppose $X \sim N(15, 3)$. Between what x values does 68.27% of the data lie? The range of x values is centered at the mean of the distribution (i.e., 15).

35.

Suppose $X \sim N(–3, 1)$. Between what x values does 95.45% of the data lie? The range of x values is centered at the mean of the distribution(i.e., –3).

36.

Suppose $X \sim N(–3, 1)$. Between what x values does 34.14% of the data lie?

37.

About what percent of x values lie between the mean and three standard deviations?

38.

About what percent of x values lie between the mean and one standard deviation?

39.

About what percent of x values lie between the first and second standard deviations from the mean (both sides)?

40.

About what percent of x values lie between the first and third standard deviations(both sides)?

Use the following information to answer the next two exercises: The life of wearable fitness devices is normally distributed with mean of 4.1 years and a standard deviation of 1.3 years. A wearable fitness device is guaranteed for three years. We are interested in the length of time a wearable fitness device lasts.

41.

Define the random variable X in words. X = _____.

42.

$X \sim$ _____(_____,_____)

43.

How would you represent the area to the left of one in a probability statement?

Figure 6.12

44.

What is the area to the right of one?

Figure 6.13

45.

Is $P(x < 1)$ equal to $P(x \leq 1)$? Why?

46.

How would you represent the area to the left of three in a probability statement?

Figure 6.14

47.

What is the area to the right of three?

Figure 6.15

48.

If the area to the left of x in a normal distribution is 0.123, what is the area to the right of x?

49.

If the area to the right of x in a normal distribution is 0.543, what is the area to the left of x?

Use the following information to answer the next four exercises:

$X \sim N(54, 8)$

50.

Find the probability that $x > 56$.

51.

Find the probability that $x < 30$.

52.

Find the 80^{th} percentile.

53.

Find the 60^{th} percentile.

54.

$X \sim N(6, 2)$

Find the probability that x is between three and nine.

55.

$X \sim N(-3, 4)$

Find the probability that x is between one and four.

56.

$X \sim N(4, 5)$

Find the maximum of x in the bottom quartile.

57.

Use the following information to answer the next three exercise: The life of wearable fitness devices is normally distributed with a mean of 4.1 years and a standard deviation of 1.3 years. A wearable fitness device is guaranteed for three years. We are interested in the length of time a wearable fitness device lasts. Find the probability that a wearable fitness device will break down during the guarantee period.

1. Sketch the situation. Label and scale the axes. Shade the region corresponding to the probability.

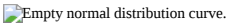

Figure 6.16

2. $P(0 < x <$ _____) = _____ (Use zero for the minimum value of x.)

58.

Find the probability that a wearable fitness device will last between 2.8 and six years.

1. Sketch the situation. Label and scale the axes. Shade the region corresponding to the probability.

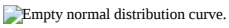

Figure 6.17

2. $P($_____ $< x <$ _____) = _____

59.

Find the 70th percentile of the distribution for the time a wearable fitness device lasts.

1. Sketch the situation. Label and scale the axes. Shade the region corresponding to the lower 70%.

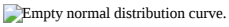

Figure 6.18

2. $P(x < k)$ = _____ Therefore, k = _____
