

## 11.2E: The Standard Normal Distribution (Exercises)

### Exercise 6.2.7

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

**Answer**

ounces of water in a bottle

### Exercise 6.2.8

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

### Exercise 6.2.9

$X \sim N(1, 2)$

$\sigma =$  \_\_\_\_\_

**Answer**

2

### Exercise 6.2.10

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.  $X =$  \_\_\_\_\_.

### Exercise 6.2.11

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

What is the median?

**Answer**

-4

### Exercise 6.2.12

$X \sim N(3, 5)$

$\sigma =$  \_\_\_\_\_

### Exercise 6.2.13

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

$\mu =$  \_\_\_\_\_

**Answer**

-2

### Exercise 6.2.14

What does a  $z$ -score measure?

### Exercise 6.2.15

What does standardizing a normal distribution do to the mean?

**Answer**

The mean becomes zero.

### Exercise 6.2.16

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

**Exercise 6.2.17**

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

**Answer**

$$z = 2$$

**Exercise 6.2.18**

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

**Exercise 6.2.19**

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

**Answer**

$$z = 2.78$$

**Exercise 6.2.20**

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

**Exercise 6.2.21**

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

**Answer**

$$x = 20$$

**Exercise 6.2.22**

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

**Exercise 6.2.23**

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

**Answer**

$$x = 6.5$$

**Exercise 6.2.24**

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

**Exercise 6.2.25**

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

**Answer**

$$x = 1$$

**Exercise 6.2.26**

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

**Exercise 6.2.27**

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

**Answer**

$$x = 1.97$$

**Exercise 6.2.28**

Suppose  $X \sim N(-1, 12)$ . What is the  $z$ -score of  $x = 2$ ?

**Exercise 6.2.29**

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

**Answer**

$z = -1.67$

#### Exercise 6.2.30

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

#### Exercise 6.2.31

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

**Answer**

$z \approx -0.33$

#### Exercise 6.2.32

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.

#### Exercise 6.2.33

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.

**Answer**

0.67, right

#### Exercise 6.2.34

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.

#### Exercise 6.2.35

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.

**Answer**

3.14, left

#### Exercise 6.2.36

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.

#### Exercise 6.2.37

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

**Answer**

about 68%

#### Exercise 6.2.38

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?

#### Exercise 6.2.39

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

**Answer**

about 4%

#### Exercise 6.2.40

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).

#### Exercise 6.2.41

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).

##### Answer

between -5 and -1

#### Exercise 6.2.42

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

#### Exercise 6.2.43

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

##### Answer

about 50%

#### Exercise 6.2.44

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

#### Exercise 6.2.45

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

##### Answer

about 27%

#### Exercise 6.2.46

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 Sunshine CD players is normally distributed with mean of 4.1 years and a standard deviation of 1.3 years. A CD player is guaranteed for three years. We are interested in the length of time a CD player lasts.

#### Exercise 6.2.47

Define the random variable  $X$  in words.  $X =$  \_\_\_\_\_.

##### Answer

The lifetime of a Sunshine CD player measured in years.

#### Exercise 6.2.48

$X \sim$  \_\_\_\_ (\_\_\_\_, \_\_\_\_)

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