

5.8: Practice

1.

Which type of distribution does the graph illustrate?


 The horizontal axis ranges from 0 to 10. The distribution is modeled by a rectangle extending from $x = 3$ to $x = 8$.

Figure 5.37

2.

Which type of distribution does the graph illustrate?


 This graph slopes downward. It begins at a point on the y-axis and approaches the x-axis at the right edge of the graph.

Figure 5.38

3.

Which type of distribution does the graph illustrate?


 This graph shows a bell-shaped graph. The symmetric graph reaches maximum height at $x = 0$ and slopes downward gradually to the x-axis on each side of the peak.

Figure 5.39

4.

What does the shaded area represent? $P(___ < x < ___)$

 This graph shows a uniform distribution. The horizontal axis ranges from 0 to 10. The distribution is modeled by a rectangle extending from $x = 1$ to $x = 8$. A region from $x = 2$ to $x = 5$ is shaded inside the rectangle.

Figure 5.40

5.

What does the shaded area represent? $P(___ < x < ___)$


 This graph shows an exponential distribution. The graph slopes downward. It begins at a point on the y-axis and approaches the x-axis at the right edge of the graph. The region under the graph from $x = 6$ to $x = 7$ is shaded.

Figure 5.41

6.

For a continuous probability distribution, $0 \leq x \leq 15$. What is $P(x > 15)$?

7.

What is the area under $f(x)$ if the function is a continuous probability density function?

8.

For a continuous probability distribution, $0 \leq x \leq 10$. What is $P(x = 7)$?

9.

A **continuous** probability function is restricted to the portion between $x = 0$ and 7. What is $P(x = 10)$?

10.

$f(x)$ for a continuous probability function is $f(x) = \frac{1}{5}$, and the function is restricted to $0 \leq x \leq 5$. What is $P(x < 0)$?

11.

$f(x)$, a continuous probability function, is equal to $f(x) = \frac{1}{12}$, and the function is restricted to $0 \leq x \leq 12$. What is $P(0 < x < 12)$?

12.

Find the probability that x falls in the shaded area.


 This shows the graph of the function $f(x) = \frac{1}{9}$, the pdf for a uniform distribution. A horizontal line ranges from the point $(0, \frac{1}{9})$ to the point $(9, \frac{1}{9})$. A vertical line extends from the x-axis to the graph at $x = 9$ creating a rectangle with the coordinate axes on two sides. A region is shaded inside the rectangle from $x = 6$ to $x = 8$.

Figure 5.42

13.

Find the probability that x falls in the shaded area.


 This shows the graph of the function $f(x) = \frac{1}{8}$, the pdf for a uniform distribution. A horizontal line ranges from the point $(0, \frac{1}{8})$ to the point $(8, \frac{1}{8})$. A vertical line extends from the x-axis to the graph at $x = 8$ creating a rectangle with the coordinate axes on two sides. A region is shaded inside the rectangle from $x = 0$ to $x = 5$.

Figure 5.43

14.

Find the probability that x falls in the shaded area.

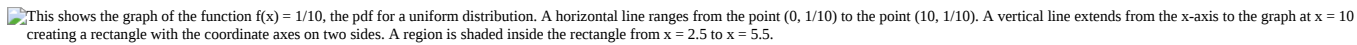
This shows the graph of the function $f(x) = 1/10$, the pdf for a uniform distribution. A horizontal line ranges from the point $(0, 1/10)$ to the point $(10, 1/10)$. A vertical line extends from the x-axis to the graph at $x = 10$ creating a rectangle with the coordinate axes on two sides. A region is shaded inside the rectangle from $x = 2.5$ to $x = 5.5$.

Figure 5.44

15.

$f(x)$, a continuous probability function, is equal to $\frac{1}{3}$ and the function is restricted to $1 \leq x \leq 4$. Describe $P(x > \frac{3}{2})$. $P(x > \frac{3}{2})$.

Use the following information to answer the next ten questions. The data that follow are the square footage (in 1,000 feet squared) of 28 homes.

1.5	2.4	3.6	2.6	1.6	2.4	2.0
3.5	2.5	1.8	2.4	2.5	3.5	4.0
2.6	1.6	2.2	1.8	3.8	2.5	1.5
2.8	1.8	4.5	1.9	1.9	3.1	1.6

Table 5.4

The sample mean = 2.50 and the sample standard deviation = 0.8302.

The distribution can be written as $X \sim U(1.5, 4.5)$.

16.

What type of distribution is this?

17.

In this distribution, outcomes are equally likely. What does this mean?

18.

What is the height of $f(x)$ for the continuous probability distribution?

19.

What are the constraints for the values of x ?

20.

Graph $P(2 < x < 3)$.

21.

What is $P(2 < x < 3)$?

22.

What is $P(x < 3.5 | x < 4)$?

23.

What is $P(x = 1.5)$?

24.

What is the 90th percentile of square footage for homes?

25.

Find the probability that a randomly selected home has more than 3,000 square feet given that you already know the house has more than 2,000 square feet.

Use the following information to answer the next eight exercises. A distribution is given as $X \sim U(0, 12)$.

26.

What is a ? What does it represent?

27.

What is b ? What does it represent?

28.

What is the probability density function?

29.

What is the theoretical mean?

30.

What is the theoretical standard deviation?

31.

Draw the graph of the distribution for $P(x > 9)$.

32.

Find $P(x > 9)$.

33.

Find the 40th percentile.

Use the following information to answer the next eleven exercises. The age of cars in the staff parking lot of a suburban college is uniformly distributed from six months (0.5 years) to 9.5 years.

34.

What is being measured here?

35.

In words, define the random variable X .

36.

Are the data discrete or continuous?

37.

The interval of values for x is _____.

38.

The distribution for X is _____.

39.

Write the probability density function.

40.

Graph the probability distribution.

1. Sketch the graph of the probability distribution.


 This is a blank graph template. The vertical and horizontal axes are unlabeled.

Figure 5.45

2. Identify the following values:

1. Lowest value for x : _____
2. Highest value for x : _____
3. Height of the rectangle: _____

4. Label for x-axis (words): _____

5. Label for y-axis (words): _____

41.

Find the average age of the cars in the lot.

42.

Find the probability that a randomly chosen car in the lot was less than four years old.

1. Sketch the graph, and shade the area of interest.


 Blank graph with vertical and horizontal axes.

Figure 5.46

2. Find the probability. $P(x < 4) =$ _____

43.

Considering only the cars less than 7.5 years old, find the probability that a randomly chosen car in the lot was less than four years old.

1. Sketch the graph, shade the area of interest.


 This is a blank graph template. The vertical and horizontal axes are unlabeled.

Figure 5.47

2. Find the probability. $P(x < 4 | x < 7.5) =$ _____

44.

What has changed in the previous two problems that made the solutions different?

45.

Find the third quartile of ages of cars in the lot. This means you will have to find the value such that 3434" role="presentation" style="position: relative;"> $\frac{3}{4}$, or 75%, of the cars are at most (less than or equal to) that age.

1. Sketch the graph, and shade the area of interest.


 Blank graph with vertical and horizontal axes.

Figure 5.48

2. Find the value k such that $P(x < k) = 0.75$.

3. The third quartile is _____

Use the following information to answer the next ten exercises. A customer service representative must spend different amounts of time with each customer to resolve various concerns. The amount of time spent with each customer can be modeled by the following distribution: $X \sim \text{Exp}(0.2)$

46.

What type of distribution is this?

47.

Are outcomes equally likely in this distribution? Why or why not?

48.

What is m ? What does it represent?

49.

What is the mean?

50.

What is the standard deviation?

51.

State the probability density function.

52.

Graph the distribution.

53.

Find $P(2 < x < 10)$.

54.

Find $P(x > 6)$.

55.

Find the 70th percentile.

Use the following information to answer the next seven exercises. A distribution is given as $X \sim \text{Exp}(0.75)$.

56.

What is m ?

57.

What is the probability density function?

58.

What is the cumulative distribution function?

59.

Draw the distribution.

60.

Find $P(x < 4)$.

61.

Find the 30th percentile.

62.

Find the median.

63.

Which is larger, the mean or the median?

Use the following information to answer the next 16 exercises. Carbon-14 is a radioactive element with a half-life of about 5,730 years. Carbon-14 is said to decay exponentially. The decay rate is 0.000121. We start with one gram of carbon-14. We are interested in the time (years) it takes to decay carbon-14.

64.

What is being measured here?

65.

Are the data discrete or continuous?

66.

In words, define the random variable X .

67.

What is the decay rate (m)?

68.

The distribution for X is _____.

69.

Find the amount (percent of one gram) of carbon-14 lasting less than 5,730 years. This means, find $P(x < 5,730)$.

1. Sketch the graph, and shade the area of interest.


 This is a blank graph template. The vertical and horizontal axes are unlabeled.

Figure 5.49

2. Find the probability. $P(x < 5,730) =$ _____

70.

Find the percentage of carbon-14 lasting longer than 10,000 years.

1. Sketch the graph, and shade the area of interest.


 Blank graph with horizontal and vertical axes.

Figure 5.50

2. Find the probability. $P(x > 10,000) =$ _____

71.

Thirty percent (30%) of carbon-14 will decay within how many years?

1. Sketch the graph, and shade the area of interest.


 This is a blank graph template. The vertical and horizontal axes are unlabeled.

Figure 5.51

2. Find the value k such that $P(x < k) = 0.30$.

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