Chapter 6 - Practice Problems 2

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Fill in the blanks by standardizing the normally distributed variable.

1) Dave drives to work each morning at about the same time. His commute time is normally distributed with a mean of 41 minutes and a standard deviation of 4 minutes. The percentage of time that his commute time lies between 33 and 37 minutes is equal to the area under the standard normal curve between ___ and ___.

A) -2.5, -1.5 B) 0, 1 C) -2, -1 D) -1.5, -0.5

2) The amount of time that customers wait in line during peak hours at one bank is normally distributed with a mean of 15 minutes and a standard deviation of 3 minutes. The percentage of time that the waiting time lies between 15 and 17 minutes is equal to the area under the standard normal curve between ___ and ___.

A) 0.8, 0.93 B) -0.67, 0 C) 0, 0.67 D) 0, 2

Provide an appropriate response.

3) Which of the variables below do you think will be roughly normally distributed?

a. Weights of 10 year old boys
b. Incomes of 40 year old adults
c. The numbers that show up when you roll a balanced die
d. The amount of coffee which a filling machine puts into "4 ounce jars"

A) a only B) a and d C) a, b, c, d D) a, b, d

4) The area under the standard normal curve between 1 and 2 is equal to 0.1359. Scores on a particular aptitude test are normally distributed with a mean of 100 and a standard deviation of 10. Which of the following are equal to 13.59%?

a. The percentage of scores between 120 and 130
b. The percentage of scores between 110 and 120
c. The percentage of scores between 80 and 90
d. The percentage of scores between 90 and 120
e. The percentage of scores between 90 and 110

A) a, b B) b, c C) d D) b E) e

Use a table of areas to find the specified area under the standard normal curve.

5) The area that lies between 0 and 3.01.

A) 0.5013 B) 0.4987 C) 0.1217 D) 0.9987

6) The area that lies to the right of 0.59.

A) 0.2776 B) 0.2190 C) 0.7224 D) 0.2224
Use a table of areas for the standard normal curve to find the required z-score.

8) Find the z-score for which the area under the standard normal curve to its left is 0.96.
   A) 1.03  B) 1.82  C) -1.38  D) 1.75

9) Find the z-score for having area 0.07 to its right under the standard normal curve, that is, find $z \cdot 0.07$.
   A) 1.26  B) 1.39  C) 1.48  D) 1.45

10) Determine the two z-scores that divide the area under the standard normal curve into a middle 0.96 area and two outside 0.02 areas.
    A) -2.05 and 2.05  B) -1.75 and 1.75  C) -2.33 and 2.33  D) 0 and 2.05

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

11) Sketch a standard normal curve and shade the area between the z-scores -2.5 and -1.
    11) ___________

12) Suppose that you know the area under the standard normal curve between 1 and 3 and the area under the standard normal curve to the left of 3. Without further consulting a table of areas, how could you find the area under the standard normal curve to the left of 1? Explain your reasoning by using a sketch of the standard normal curve.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the indicated probability or percentage for the normally distributed variable.

13) The variable X is normally distributed. The mean is $\mu = 60.0$ and the standard deviation is $\sigma = 4.0$.
    Find $P(X < 53.0)$.
    A) 0.0802  B) 0.9599  C) 0.5589  D) 0.0401

14) The diameters of bolts produced by a certain machine are normally distributed with a mean of 0.30 inches and a standard deviation of 0.01 inches. What percentage of bolts will have a diameter greater than 0.32 inches?
    A) 97.72%  B) 2.28%  C) 47.72%  D) 37.45%

15) A bank’s loan officer rates applicants for credit. The ratings are normally distributed with a mean of 200 and a standard deviation of 50. If an applicant is randomly selected, find the probability of a rating that is between 200 and 275.
    A) 0.0668  B) 0.4332  C) 0.5  D) 0.9332
Use the empirical rule to solve the problem.

16) The lifetimes of lightbulbs of a particular type are normally distributed with a mean of 360 hours and a standard deviation of 5 hours. What percentage of the bulbs have lifetimes that lie within 1 standard deviation to either side of the mean?

A) 31.74%  
B) 68.26%  
C) 95.44%  
D) 99.99%

17) The systolic blood pressure of 18-year-old women is normally distributed with a mean of 120 mmHg and a standard deviation of 12 mmHg. What percentage of 18-year-old women have a systolic blood pressure between 96 mmHg and 144 mmHg?

A) 99.74%  
B) 68.26%  
C) 95.44%  
D) 99.99%

18) The annual precipitation for one city is normally distributed with a mean of 390 inches and a standard deviation of 3.2 inches. Fill in the blanks.

In 95.44% of the years, the precipitation in this city is between _____ and _____ inches.

A) 383.6, 396.4  
B) 380.4, 399.6  
C) 390, 396.4  
D) 380.4, 390

Find the specified percentile, quartile, or decile.

19) At one college, GPA’s are normally distributed with a mean of 2.6 and a standard deviation of 0.4. Find the third quartile, $Q_3$.

A) 2.332  
B) 2.8  
C) 2.9  
D) 2.868

20) Suppose that replacement times for washing machines are normally distributed with a mean of 10.6 years and a standard deviation of 1.2 years. Find the 82nd percentile.

A) 11.7 years  
B) 10.8 years  
C) 11.0 years  
D) 9.5 years

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Provide an appropriate response.

21) Suppose that scores on a test are normally distributed with a mean of 80 and a standard deviation of 8. Read the two questions below.

A. What is the 90th percentile?
B. What percentage of students score less than 90?

Explain the difference between the two questions. Describe how the method for solving A would differ from the method for solving B. Be sure to include in your explanation a description of how the table of areas would be used in each case.
Answer Key
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11) A correct response should resemble the following:

![Diagram of standard normal distribution]

12) The area under the standard normal curve to the left of 1 can be found by subtracting the area between 1 and 3 from the area to the left of 3.
21) Answers will vary. Possible answer: In A, a percentage is given and the corresponding observation is required. The table of areas would be used to find the z-score having an area of 0.9 to its left and the z-score would then be converted to an x-value.

In B, the probability that X falls in a specified range is required. The x-value would be converted to a z-score and the table of areas would be used to find the area corresponding to the z-score.