6.8: Chapter Practice

6.1 The Standard Normal Distribution

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

$\sigma =$ _____

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. $X \sim N(3, 5)$

$\sigma =$ _____

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

$\mu =$ _____

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 betwween 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.

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

42. $X \sim$ _____(_____,_____)

6.4 Estimating the Binomial with the Normal Distribution

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

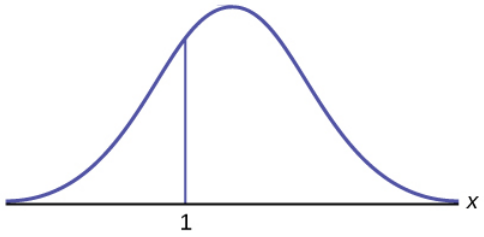

Figure 6.8.1

44. What is the area to the right of one?

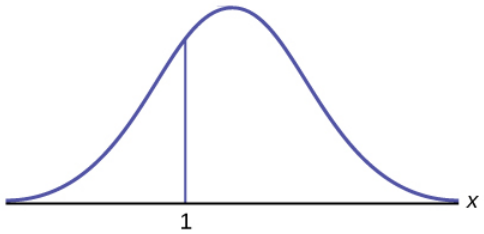

Figure 6.8.2

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?

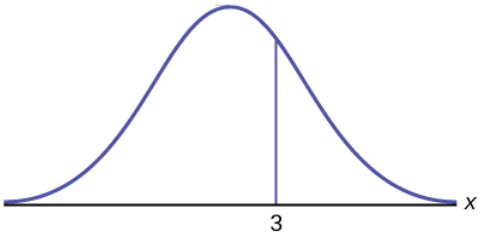

Figure 6.8.3

47. What is the area to the right of three?

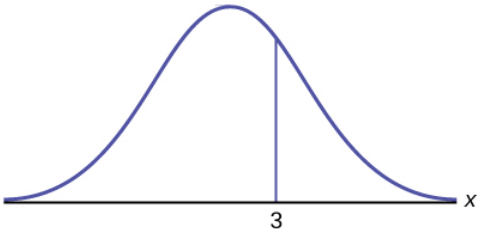

Figure 6.8.4

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. $X \sim N(6, 2)$

Find the probability that x is between three and nine.

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

Find the probability that x is between one and four.

54. $X \sim N(4, 5)$

Find the maximum of x in the bottom quartile.

55. *Use the following information to answer the next three exercise:* The life of Sunshine CD players is normally distributed with a 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. Find the probability that a CD player will break down during the guarantee period.

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

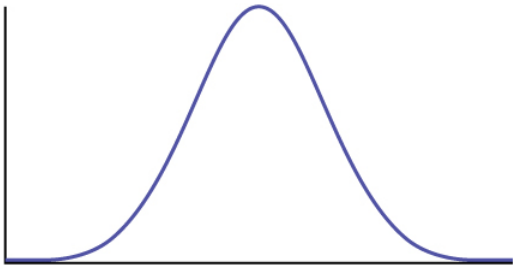

Figure 6.8.5

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

56. Find the probability that a CD player will last between 2.8 and six years.

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

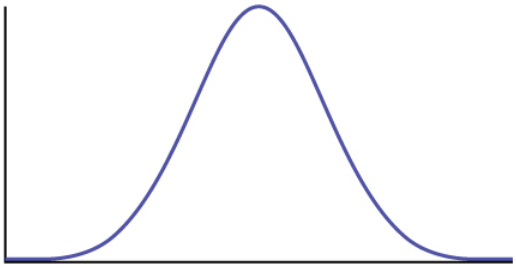

Figure 6.8.18

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

57. An experiment with a probability of success given as 0.40 is repeated 100 times. Use the normal distribution to approximate the binomial distribution, and find the probability the experiment will have at least 45 successes.

58. An experiment with a probability of success given as 0.30 is repeated 90 times. Use the normal distribution to approximate the binomial distribution, and find the probability the experiment will have at least 22 successes.

59. An experiment with a probability of success given as 0.40 is repeated 100 times. Use the normal distribution to approximate the binomial distribution, and find the probability the experiment will have from 35 to 45 successes.

60. An experiment with a probability of success given as 0.30 is repeated 90 times. Use the normal distribution to approximate the binomial distribution, and find the probability the experiment will have from 26 to 30 successes.

61. An experiment with a probability of success given as 0.40 is repeated 100 times. Use the normal distribution to approximate the binomial distribution, and find the probability the experiment will have at most 34 successes.

62. An experiment with a probability of success given as 0.30 is repeated 90 times. Use the normal distribution to approximate the binomial distribution, and find the probability the experiment will have at most 34 successes.

63. A multiple choice test has a probability any question will be guesses correctly of 0.25. There are 100 questions, and a student guesses at all of them. Use the normal distribution to approximate the binomial distribution, and determine the probability at least 30, but no more than 32, questions will be guessed correctly.

64. A multiple choice test has a probability any question will be guesses correctly of 0.25. There are 100 questions, and a student guesses at all of them. Use the normal distribution to approximate the binomial distribution, and determine the probability at least 24, but no more than 28, questions will be guessed correctly.
