4.8: Chapter 4 Solutions

1. ounces of water in a bottle

3. 2

5. –4

7. –2

9. The mean becomes zero.

11. $z = 2$

13. $z = 2.78$

15. $x = 20$

17. $x = 6.5$

19. $x = 1$

21. $x = 1.97$

23. $z = -1.67$

25. $z \approx -0.33$

27. 0.67, right

29. 3.14, left

31. about 68%

33. about 4%

35. between –5 and –1

37. about 50%

39. about 27%

41. The lifetime of a gaming console measured in years.

43. $P(x < 1)$

45. Yes, because they are the same in a continuous distribution: $P(x = 1) = 0$

47. $1 - P(x < 3)$ or $P(x > 3)$

49. $1 - 0.543 = 0.457$

51. 0.0013

53. 0.1186

55.

1. Check student’s solution.
2. 3, 0.1977

66. c

68.

1. Use the *z*-score formula. $z = -0.5141$. The height of 77 inches is 0.5141 standard deviations below the mean. An NBA player whose height is 77 inches is shorter than average.
2. Use the *z*-score formula. $z = 1.5424$. The height 85 inches is 1.5424 standard deviations above the mean. An NBA player whose height is 85 inches is taller than average.
3. $\text{Height} = 79 + 3.5(3.89) = 92.615 \text{inches}$, which is taller than 7 feet, 8 inches. There are very few NBA players this tall so the answer is no, not likely.

70.

1. iv
2. Kyle's blood pressure is equal to $125+(1.75)(14)=149.5$.

72. Let $X=$ an SAT math score and $Y=$ an ACT math score.

1. $X=720$, $\frac{720-520}{15}=1.74$ The exam score of 720 is 1.74 standard deviations above the mean of 520.
2. $z=1.5$
   The math SAT score is $520+1.5(115)\approx 692.5$. The exam score of 692.5 is 1.5 standard deviations above the mean of 520.
3. $\frac{X-\mu}{\sigma}=\frac{700-514}{117}\approx 1.59$, the z-score for the SAT. $\frac{Y-\mu}{\sigma}=\frac{30-21}{5.3}\approx 1.70$, the z-scores for the ACT. With respect to the test they took, the person who took the ACT did better (has the higher z-score).

75. d

77.

1. $X\sim N(66,2.5)$
2. 0.5404
3. No, the probability that an Asian male is over 72 inches tall is 0.0082

79.

1. $X\sim N(36,10)$
2. The probability that a person views more than 40 advertisements per day is 0.3446.
3. Approximately 25% of people view fewer than 29.26 advertisements per day.

81.

1. $X=$ number of hours that a Chinese four-year-old in a rural area is unsupervised during the day.
2. $X\sim N(3,1.5)$
3. The probability that the child spends less than one hour a day unsupervised is 0.0918.
4. The probability that a child spends over ten hours a day unsupervised is less than 0.0001.
5. 2.22 hours

83.

1. $X=$ the distribution of the number of days a particular type of criminal trial will take
2. $X\sim N(21,7)$
3. The probability that a randomly selected trial will last more than 24 days is 0.3336.
4. 22.77

85.

1. mean = 5.70, *s* = 2.54
2. Check student's solution.
3. Check student's solution.
4. Check student's solution.
5. $X\sim N(5.70,2.54)$
6. 0.5478
7. The cumulative frequency for less than 6 minutes is 0.50.
8. The answers to part 6 and part 7 are not exactly the same, because the normal distribution is only an approximation to the real one.
9. The answers to part 6 and part 7 are close, because a normal distribution is an excellent approximation - but more so when the sample size is greater than 30.
10. The approximation would have been (even) less accurate, because the smaller sample size means that the data does not fit normal curve as well.

88.

- $n=100; p=0.1; q=0.9$
- $\mu=np=(100)(0.10)=10$

- $\sigma = \sqrt{npq} = \sqrt{(100)(0.1)(0.9)} = 3$

1. $z = \pm 1 : x_1 = \mu + z\sigma = 10 + 1(3) = 13 \text{ and } x_2 = \mu - z\sigma = 10 - 1(3) = 7.68\%$ of the defective cars will fall between seven and 13.
2. $z = \pm 2 : x_1 = \mu + z\sigma = 10 + 2(3) = 16 \text{ and } x_2 = \mu - z\sigma = 10 - 2(3) = 4.95\%$ of the defective cars will fall between four and 16
3. $z = \pm 3 : x_1 = \mu + z\sigma = 10 + 3(3) = 19 \text{ and } x_2 = \mu - z\sigma = 10 - 3(3) = 1.99.7\%$ of the defective cars will fall between one and 19.

90.

- $n = 190; p = 1515 = 0.2; q = 0.8$
- $\mu = np = (190)(0.2) = 38$
- $\sigma = \sqrt{npq} = \sqrt{(190)(0.2)(0.8)} = 5.5136$

1. For this problem: $P(34 < x < 54) = 0.7641$
2. For this problem: $P(54 < x < 64) = 0.0018$
3. For this problem: $P(x > 64) = 0.0000012$ (approximately 0)

92.

1. 24.5
2. 3.5
3. Yes
4. 0.67

93.

1. 63
2. 2.5
3. Yes
4. 0.88

94. 0.02

95. 0.37

96. 0.50