

1.2: Normal Solution (Practice + Homework)

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 Sunshine CD player 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.
57. 0.154 0.874
59. 0.693
60. 0.346
61. 0.110
62. 0.946
63. 0.071
64. 0.347
66. c
- 68.

- a. 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.
- b. 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.
- c. Height = $79 + 3.5(3.89) = 92.615$ 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.

- a. iv
- b. 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.

- a. $X = 720$ $720 - 520 = 170$ $170 - 520 = 1.74$ The exam score of 720 is 1.74 standard deviations above the mean of 520.
- b. $z = 1.5$
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.
- c. $X - \mu_X - \mu_X = 700 - 514 = 186$ $186 - 514 = 1.59$, the z-score for the SAT. $Y - \mu_Y - \mu_Y = 30 - 215.330 - 215.3 \approx 1.70$, 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

79.

- a. $X \sim N(66, 2.5)$
- b. 0.5404
- c. No, the probability that an Asian male is over 72 inches tall is 0.0082

81.

- a. X = number of hours that a Chinese four-year-old in a rural area is unsupervised during the day.
- b. $X \sim N(3, 1.5)$
- c. The probability that the child spends less than one hour a day unsupervised is 0.0918.
- d. The probability that a child spends over ten hours a day unsupervised is less than 0.0001.
- e. 2.21 hours

83.

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

85.

- a. mean = 5.51, $s = 2.15$
- b. Check student's solution.
- c. Check student's solution.
- d. Check student's solution.
- e. $X \sim N(5.51, 2.15)$
- f. 0.6029
- g. The cumulative frequency for less than 6.1 minutes is 0.64.
- h. The answers to part f and part g are not exactly the same, because the normal distribution is only an approximation to the real one.
- i. The answers to part f and part g are close, because a normal distribution is an excellent approximation when the sample size is greater than 30.
- j. The approximation would have been less accurate, because the smaller sample size means that the data does not fit normal curve as well.

88.

- $n = 100; p = 0.1; q = 0.9$
- $\mu = np = (100)(0.1) = 10$
- $\sigma = \sqrt{npq} = \sqrt{(100)(0.1)(0.9)} = 3$

i. $z = \pm 1 : x_1 = \mu + z\sigma = 10 + 1(3) = 13$ and $x_2 = \mu - z\sigma = 10 - 1(3) = 7.68\%$ of the defective cars will fall between seven and 13 .

ii. $z = \pm 2 : x_1 = \mu + z\sigma = 10 + 2(3) = 16$ and $x_2 = \mu - z\sigma = 10 - 2(3) = 4.95\%$ of the defective cars will fall between four and 16

iii. $z = \pm 3 : x_1 = \mu + z\sigma = 10 + 3(3) = 19$ and $x_2 = \mu - z\sigma = 10 - 3(3) = 1.99.7\%$ of the defective cars will fall between one and 19.

90.

- $n = 190; p = \frac{1}{5} = 0.2; q = 0.8$
- $\mu = np = (190)(0.2) = 38$
- $\sigma = \sqrt{npq} = \sqrt{(190)(0.2)(0.8)} = 5.5136$

a. For this problem: $P(34 < x < 54) = 0.7641$

b. For this problem: $P(54 < x < 64) = 0.0018$

c. For this problem: $P(x > 64) = 0.0000012$ (approximately 0)

92.

- 24.5
- 3.5
- Yes
- 0.67

93.

- 63
- 2.5
- Yes
- 0.88

94. 0.02

95. 0.37

96. 0.50

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