Chapter 8 Homework Solutions
Compiled by Joe Kahlig

1. (a) You are counting the number of games and there are a limited number of games in a tennis match. Answer: Finite discrete
(b) you are counting the number of tickets. Answer: Infinite discrete
(c) Time is an interval and it doesn’t skip values. Answer: Continuous
(d) The number may be very large(hopefully), but it is still only a fixed number. Answer: Finite discrete
(e) Temperature is an interval and it doesn’t skip values. Answer: Continuous

2. (a) There are 52 − 13 = 39 non-heart cards in a deck, so the maximum number of cards you could draw is 39 without drawing a heart. So the worst case scenario is 40 cards drawn. Answer: Finite discrete
Values: X = 1, 2, ..., 40
(b) Continuous
Values: \{x = \text{time in hours} \mid 0 \leq X \leq 24\}
(c) You could always roll a one, so it might not happen that you roll a six. Answer: Infinite discrete
Values: X = 1, 2, 3, 4, ...

3. The areas of the rectangles must add to one since the rectangles represent probability. The missing rectangle has an area of 0.15.
Answer: 0.15 + 0.2 + 0.3 = 0.65 or 1 − 0.1 − 0.25 = 0.65

4. Let \( P(X = 6) = J \) then \( P(X = 3) = 2J \)
0.1 + 0.25 + \( P(X = 3) \) + 0.2 + 0.15 + \( P(X + 6) \) = 1 (from the histogram).
\( P(X = 3) + P(X + 6) = 0.3 \)
\( 2J + J = 0.3 \)
and get \( J = 0.1 \)
Answer: 0.45 = \( P(X = 4) + P(X = 5) + P(X = 6) \)

5. (a) Divide the frequency by the total number of students who have waited to get relative frequency(or probability).

<table>
<thead>
<tr>
<th>students</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>4</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>prob.</td>
<td>( \frac{3}{25} )</td>
<td>( \frac{10}{25} )</td>
<td>( \frac{1}{25} )</td>
<td>( \frac{1}{25} )</td>
<td>( \frac{1}{25} )</td>
</tr>
</tbody>
</table>
(b) probability histogram

6. There are a total of 7 cards that will be made. Three of them will have a word with three letters: Get, Its, fun. Answer:

<table>
<thead>
<tr>
<th>letters</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>prob.</td>
<td>( \frac{3}{7} )</td>
<td>( \frac{1}{7} )</td>
<td>( \frac{2}{7} )</td>
<td>( \frac{1}{7} )</td>
</tr>
</tbody>
</table>

7. (a) There can be different answers depending where your intervals start.

<table>
<thead>
<tr>
<th>speed(x)</th>
<th>freq</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 ≤ x &lt; 30</td>
<td>6</td>
</tr>
<tr>
<td>30 ≤ x &lt; 35</td>
<td>7</td>
</tr>
<tr>
<td>35 ≤ x &lt; 40</td>
<td>9</td>
</tr>
<tr>
<td>40 ≤ x &lt; 45</td>
<td>8</td>
</tr>
<tr>
<td>45 ≤ x &lt; 50</td>
<td>5</td>
</tr>
<tr>
<td>50 ≤ x &lt; 55</td>
<td>5</td>
</tr>
</tbody>
</table>
(b) prob dist.

<table>
<thead>
<tr>
<th>speed(x)</th>
<th>prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 ≤ x &lt; 30</td>
<td>( \frac{6}{40} )</td>
</tr>
<tr>
<td>30 ≤ x &lt; 35</td>
<td>( \frac{7}{40} )</td>
</tr>
<tr>
<td>35 ≤ x &lt; 40</td>
<td>( \frac{9}{40} )</td>
</tr>
<tr>
<td>40 ≤ x &lt; 45</td>
<td>( \frac{8}{40} )</td>
</tr>
<tr>
<td>45 ≤ x &lt; 50</td>
<td>( \frac{5}{40} )</td>
</tr>
<tr>
<td>50 ≤ x &lt; 55</td>
<td>( \frac{5}{40} )</td>
</tr>
</tbody>
</table>

8. (a) frequency table
9. Remember that the remainder is what is left over after performing long division (by hand). For example: 7 divide by 3 has a remainder of 1 since 3 goes into 7 two times (this gives 3 * 2 = 6) and 1 will be left over.

<table>
<thead>
<tr>
<th>remainder</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>prob.</td>
<td>2/3</td>
<td>1/3</td>
<td>1/3</td>
</tr>
</tbody>
</table>

10. The tree shows the experiment. Notice the tree stops on the third level since either a head is tossed or the coin has been tossed three times.

Use the branches to get the probability.

Answer:

<table>
<thead>
<tr>
<th>tosses</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>prob.</td>
<td>1/2</td>
<td>1/3</td>
<td>1/3</td>
</tr>
</tbody>
</table>

11. (a) \(P(X = 0) = \frac{C(5,0) \cdot C(7,3)}{C(12,3)}\)

(b) \(P(X = 2) = \frac{C(4,2) \cdot C(8,1)}{C(12,3)}\)

12. (a) \(P(X = 2) = \frac{C(5,2) \cdot C(7,1)}{C(12,3)} = \frac{70}{220}\)

(b) \(P(X \leq 2) = \frac{C(5,0) \cdot C(7,3)}{C(12,3)} + \frac{C(5,1) \cdot C(7,2)}{C(12,3)} + \frac{C(5,2) \cdot C(7,1)}{C(12,3)} = \frac{210}{220}\)

or

\[P(X \leq 2) = 1 - P(X = 3) = 1 - \frac{C(5,3) \cdot C(7,0)}{C(12,3)}\]

13. (a) \(E(x) = 1 \cdot 0.3 + 2 \cdot 0.15 + 4 \cdot 0.35 + 5 \cdot 0.2 = 3\)

(b) histogram

14. To calculate \(P(X = 70)\) remember that the probabilities must add to 1.

\[E(X) = 30 \cdot 0.31 + 32 \cdot 0.25 + 46 \cdot 0.29 + 49 \cdot 0.06 + 63 \cdot 0.04 + 70 \cdot 0.05 = 39.6\]

15. (a) Write out the cards and give the score to each card.

Note: the order of the numbers is not important.

<table>
<thead>
<tr>
<th>Card</th>
<th>Score</th>
<th>Card</th>
<th>Score</th>
<th>Card</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,2</td>
<td>1</td>
<td>1,3</td>
<td>1</td>
<td>1,4</td>
<td>10</td>
</tr>
<tr>
<td>1,5</td>
<td>1</td>
<td>2,3</td>
<td>10</td>
<td>2,4</td>
<td>2</td>
</tr>
<tr>
<td>2,5</td>
<td>2</td>
<td>3,4</td>
<td>3</td>
<td>3,5</td>
<td>3</td>
</tr>
<tr>
<td>4,5</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Answer:

<table>
<thead>
<tr>
<th>score</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>prob.</td>
<td>1/10</td>
<td>2/10</td>
<td>2/10</td>
<td>1/10</td>
<td>1/10</td>
</tr>
</tbody>
</table>

(b) \(E(x) = 1 \cdot \frac{19}{36} + 2 \cdot \frac{13}{36} + 3 \cdot \frac{22}{36} + 4 \cdot \frac{3}{36} + 10 \cdot \frac{4}{36} = 3.7\)

16. The probabilities may be computed using a tree or combinations.

(a) hearts

| prob. | 1/3 | 1/3 | 1/3 |

(b) \(E(x) = 0 \cdot \frac{19}{36} + 1 \cdot \frac{13}{36} + 2 \cdot \frac{4}{36} = 0.5\)

17. Use a dice chart to find the probabilities.

(a) hearts

<table>
<thead>
<tr>
<th>dice</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>prob.</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
<td>1/3</td>
</tr>
</tbody>
</table>

(b) \(E(x) = 1 \cdot \frac{1}{36} + 2 \cdot \frac{3}{36} + 3 \cdot \frac{5}{36} + 4 \cdot \frac{7}{36} + 5 \cdot \frac{9}{36} + 6 \cdot \frac{11}{36}\)

\[E(X) = 4.47222\]
18. Note: X is the **net winnings**.

<table>
<thead>
<tr>
<th>X</th>
<th>1999</th>
<th>499</th>
<th>99</th>
<th>24</th>
<th>-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>probability</td>
<td>$\frac{1}{500}$</td>
<td>$\frac{1}{500}$</td>
<td>$\frac{3}{500}$</td>
<td>$\frac{10}{500}$</td>
<td>$\frac{485}{500}$</td>
</tr>
</tbody>
</table>

(b) 5.1

19. X = profit on a chip.

<table>
<thead>
<tr>
<th>X</th>
<th>18</th>
<th>-23</th>
</tr>
</thead>
<tbody>
<tr>
<td>prob.</td>
<td>0.95</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Answer: $E(x) = 18 \times 0.95 + (-23) \times 0.05 = 15.95$

20. X is your net winnings.

<table>
<thead>
<tr>
<th>hearts</th>
<th>-5</th>
<th>-4</th>
<th>-1</th>
<th>1</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>probability</td>
<td>$\frac{3}{7}$</td>
<td>$\frac{3}{7}$</td>
<td>$\frac{1}{2}$</td>
<td>$\frac{1}{2}$</td>
<td>$\frac{1}{2}$</td>
</tr>
</tbody>
</table>

$E(X) = (-5) \times \frac{1}{8} + (-4) \times 3/8 + (-1) \times 3/8 + 4 \times 1/8$

$E(X) = -2$

21. Use a tree to set up the probability distribution.

![Tree diagram]

(a) $E(X) = -1.50$

(b) $E(X) = -0.43$ so the game is not fair.

22. Use a tree or combinations to find the probabilities.

X is your net winnings and A be the cost of the game.

<table>
<thead>
<tr>
<th>X</th>
<th>1 red</th>
<th>2 red</th>
<th>0 red</th>
</tr>
</thead>
<tbody>
<tr>
<td>prob</td>
<td>$\frac{20}{36}$</td>
<td>$\frac{36}{36}$</td>
<td>$\frac{10}{36}$</td>
</tr>
</tbody>
</table>

If the game is fair then $E(x) = 0$

$0 = \frac{20}{36} \times (4-A) + \frac{6}{36} \times (2A) + \frac{10}{36} \times (-A)$

$0 = 20(4-A) + 12A - 10A$

$18A = 80$

$A = \frac{80}{18} = 4.44$

So to make it fair (or as fair as possible) charge $4.44.

23. X is the your net winnings.

<table>
<thead>
<tr>
<th>X</th>
<th>2</th>
<th>1</th>
<th>-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>prob.</td>
<td>$\frac{1}{4}$</td>
<td>$\frac{1}{4}$</td>
<td>$\frac{1}{4}$</td>
</tr>
</tbody>
</table>

(a) -1.5

(b) No, the expected winnings are negative. For this problem the game favors the person running the game.

(c) Let $A$ = Price of the game, then solve the following equation,

<table>
<thead>
<tr>
<th>X</th>
<th>7 - A</th>
<th>6 - A</th>
<th>2 - A</th>
</tr>
</thead>
<tbody>
<tr>
<td>prob.</td>
<td>$\frac{1}{6}$</td>
<td>$\frac{1}{6}$</td>
<td>$\frac{4}{6}$</td>
</tr>
</tbody>
</table>

$0 = (7 - A) \times 1/6 + (6 - A) \times 1/6 + (2 - A) \times 4/6$

$A = 3.5$

Answer: $3.50$

24. (a) X is the revenue at each location.

Location A

<table>
<thead>
<tr>
<th>X</th>
<th>4.5</th>
<th>4</th>
<th>6.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>prob.</td>
<td>0.5</td>
<td>0.2</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Expected value of each location:

Location A: $4.5 \times 0.5 + 4 \times 0.2 + 6.5 \times 0.3 = 5$

Location B: $4.5 \times 0.25 + 4 \times 0.2 + 6.5 \times 0.55 = 5.5$

(b) Total revenue at location B is

$1500 \times 5.5 = 8250$

more than $\frac{8250}{3} = 1650$ people

25. $\frac{7}{7+4} = \frac{7}{11}$

26. $\frac{23}{23+15} = \frac{23}{38}$

27. simplify $P(J) = \frac{0.25}{0.38} = \frac{25}{38}$

Answer: 12 to 37

28. $P(A^C) = \frac{7}{15+7} = \frac{7}{22}$

29. $P(E) = \frac{2}{3}$ and $P(F) = \frac{10}{29}$. Since E and F are independent, $P(E \cap F) = P(E) \times P(F)$

$P(E \cap F) = \frac{2}{3} \times \frac{10}{29} = \frac{20}{87}$

30. $P(E) = \frac{21}{40}$

31. prob of 5th card is a heart given the information is $\frac{13}{39}$

Answer: 12 to 37

32. Mean = 4.9

Median = 5

Mode = 6

33. Mean = 21.31818

Median = 20.5

Mode = 19 and 24

34. The fifth score is less than or equal to 82 since 82 is the median and there are 2 scores that are above this number.
35. Answers will vary. I used the middle of each interval
\[
\frac{2.5+3.5+4.5+4.5+9+10}{8+10+24+35+33+25} = 15.0316
\]

36. Answers will vary. used the middle of each interval.
Estimated Mean: 30.96

37. Enter the x-value in list 1 and the frequency in list 2. use
the command: 1-Var Stats L₁, L₂
(a) mean: \( \bar{x} = 3.75 \)
median = 4
mode = 4
standard deviation: \( \sigma_x = 1.25 \)
variance: \( (\sigma_x)^2 = 1.5625 \)
(b) mean: \( \bar{x} = 7.3333 \)
median = 4
mode = 1 and 15
standard deviation: \( \sigma_x = 6.315765 \)
variance: \( (\sigma_x)^2 = 39.88888754 \)

38. Enter the x-value in list 1 and the frequency in list 2. use
the command: 1-Var Stats L₁, L₂
(a) mean: \( \bar{x} = 41.8023 \)
(b) median = 31.5
(c) mode = 90
(d) standard deviation: \( S_x = 32.8697 \)
(e) variance: \( S_x^2 = 1080.4171 \)
(f) \( Q_1 = 12 \) At least 25% of the people surveyed drink
12 or fewer Dr. Peppers during the semester.
\( Q_2 = \text{median} = 31.5 \) At least 50% of the people
surveyed drink 31.5 or fewer Dr. Peppers during the semester.
\( Q_3 = 90 \) At least 75% of the people surveyed drink
90 or fewer Dr. Peppers during the semester.

39. Answers will vary. I used the middle of each interval.
(a) mean = 11.42333
(b) standard deviation: \( \sigma_x = 6.561437 \)
(c) 11-20

40. Enter the age in list 1 and the frequency in list 2. use
the command: 1-Var Stats L₁, L₂
(a) Mean = 2.6225
Median = 3
Mode = 3
(b) \( Q_1 = 2 \) At least 25% of the cars are 2 years or
younger.
\( Q_2 = \text{median} = 3 \) At least 50% of the cars are 3
years or younger.
\( Q_3 = 3 \) At least 75% of the cars are 3 years or
younger.

41. Create a probability distribution from the histogram. Enter
the x-values in list 1 and the probability in list 2. use
the command: 1-Var Stats L₁, L₂
(a) \( E(x) = \bar{x} = 3.5 \)
(b) \( \sigma_x = 1.62788206 \)
(c) variance = \( (\sigma_x)^2 = 2.65000001 \)

42. Use Chebychev’s inequality.
\( \mu + k\sigma = 27.2 \)
\( 20 + k \times 2.4 = 27.2 \)
\( k = 3 \)
\( P(12.8 \leq X \leq 27.2) \geq 1 - \frac{1}{k^2} = \frac{8}{9} \)

43. Use Chebychev’s inequality.
\( \mu + k\sigma = 37.3 \)
\( 35 + k \times 4.5 = 37.3 \)
\( k = 0.6 \)
\( P(32.3 \leq X \leq 37.7) \geq 1 - \frac{1}{0.6^2} = -1.77777 \)
Note: Chebyshev’s inequality doesn’t really give useful
information for this problem.

44. Use Chebychev’s inequality.
(a) \( \mu + k\sigma = 213 \)
\( 213 = 205 + 2 \times k \)
\( k = 4 \)
\( P(197 \leq X \leq 213) \geq 1 - \frac{1}{4^2} \)
Answer: \( \geq 0.9375 = \frac{15}{16} \)
(b) Want to compute: \( P(X < 185) + P(X > 225) \)
notice that:
\( P(X < 185) + P(X > 225) = 1 - P(185 \leq X \leq 225) \)
\( \mu + k\sigma = 225 \)
\( 225 = 205 + 2 \times k \)
\( k = 10 \)
\( P(185 \leq X \leq 225) \geq 1 - \frac{1}{10^2} = 0.99 \)
Answer: \( \leq 0.01 \)

45. Use Chebychev’s inequality.
\( \mu + k\sigma = 106 \)
\( 100 + k \times 2.8 = 106 \)
\( k = \frac{15}{7} \)
\( P(94 \leq X \leq 106) \geq 1 - \frac{1}{(15/7)^2} = 0.782222 \)
We would expect at least 0.782222 \( \times 10000 \) or at least 7822
boxes to have between 94 and 106 paperclips.
46. (a) \((\frac{1}{6})^6 \times (\frac{5}{6})^2\)
(b) \(C(8, 6) \times 0.2^6 \times 0.8^2 + C(8, 7) \times 0.2^7 \times 0.8^1 + C(8, 8) \times 0.2^8 \times 0.8^0\)

or

\( \text{binompdf}(8,1/5,6) + \text{binompdf}(8,1/5,7) + \text{binompdf}(8,1/5,8) \)

or

\( \text{binomcdf}(8,1/5,8) - \text{binompdf}(8,1/5,5) \)

Answer: 0.00123136

47. (a) \(\text{binompdf}(80,0.15,5) = C(80,5) \times 0.15^5 \times 0.85^75\)

Answer: 0.0092856108

(b) \(\text{binomcdf}(80,0.15,15) = 0.8624663485\)

(c) \(\text{binomcdf}(80,0.15,10) - \text{binomcdf}(80,0.15,2)\)

Answer: 0.3297

(d) \(\text{binomcdf}(80,0.15,20) - \text{binomcdf}(80,0.15,12)\)

Answer: 0.4175

48. Note: expected value is an average so do not round the answer.

(a) \(E(X) = n \times p = 80 \times 0.18 = 14.4\)

(b) \(E(X) = n \times p = 80 \times 0.82 = 65.6\)

49. (a) \(\left(\frac{1}{5}\right)^4 \times \left(\frac{3}{5}\right)^6\)

(b) \(\text{binomcdf}(10, 1/6, 3) = 0.9303\)

(c) \(\text{binomcdf}(10,1/6,1) + \text{binompdf}(10,1/6,2) + \text{binompdf}(10,1/6,6)\)

or

\(C(10, 1) \times \left(\frac{1}{6}\right) \times \left(\frac{5}{6}\right)^9 + C(10, 2) \times \left(\frac{1}{6}\right)^2 \times \left(\frac{5}{6}\right)^8 + C(10, 6) \times \left(\frac{1}{6}\right)^6 \times \left(\frac{5}{6}\right)^4\)

Answer: 0.6159

(d) expected number of questions correct is \(10 \times \frac{1}{5} = 1.667\)

eXpected grade is \(10 \times \text{E}(X) = 16.667\)

50. (a) \(\text{binompdf}(75,0.05,5) = C(75,5) \times 0.05^5 \times 0.95^70\)

Answer: 0.148777

(b) \(E(x) = 75 \times 0.05 = 3.75\) Note: expected value is an average so do not round the answer.

51. (a) \(\text{binompdf}(12, \frac{1}{5}, 6) = C(12,6) \times \left(\frac{1}{5}\right)^6 \times \left(\frac{4}{5}\right)^6\)

Answer: 0.0066

(b) \(\text{binomcdf}(12, \frac{1}{5}, 3) = 0.8748\)

52. \(E(x) = 20 \times \frac{1}{8} = 2.5 = \frac{20}{8}\)

53. \(\text{binomcdf}(5,0.65,5) = \text{binomcdf}(5,0.65,2) = 0.7648\)

54. (a) \(\text{binompdf}(20,0.7, 18) = C(20,18) \times 0.7^{18} \times 0.3^{2}\)

Answer: 0.27846

(b) \(\text{binomcdf}(20,0.7,20) - \text{binomcdf}(20,0.7,16)\)

Answer: 0.1071

(c) \(\text{binompdf}(20,0.7, 10) + \text{binompdf}(20,0.7, 11) + \text{binompdf}(20,0.7, 12) + \text{binompdf}(20,0.7, 15) + \text{binompdf}(20,0.7, 16)\)

Answer: 0.5199

55. (a) \(\mu = 80 \times .15 = 12\)

\(\sigma = \sqrt{80 \times .15 \times .85} = 3.1937\)

(b) within 1 standard deviation means

\(\mu - 1 \times \sigma \leq X \leq \mu + 1 \times \sigma\)

or

\(x = 9, 10, 11, 12, 13, 14, 15\)

\(\text{binomcdf}(80,0.15,15) - \text{binomcdf}(80,0.15,8)\)

Answer: 0.7283

56. (a) \(\text{binomcdf}(7,\frac{3}{12}, 7) = \text{binomcdf}(7,\frac{3}{12}, 1)\)

Answer: 0.1100617

(b) \(\text{binomcdf}(\frac{3}{12}, 7) = \text{binomcdf}(\frac{3}{12}, 1)\)

Answer: 0.1137008179

57. \(\text{binomcdf}(18,\frac{3}{12}, 18) - \text{binomcdf}(18,\frac{3}{12}, 3)\)

Answer: 0.6943108

58. (a) \(\left(\frac{20}{12}\right)^4 \times \left(\frac{32}{12}\right)^2\)

(b) \(\text{binompdf}(6,\frac{20}{12}, 4)\)

Answer: 0.1243057

(c) \(E(x) = 6 \times \frac{20}{12} = 2.30769\)

59. (a) \(\text{normalcdf}(1.25,1E99,0,1) = 0.1056\)

(b) \(\text{normalcdf}(-1, 1.5, 0, 1) = 0.7745\)

(c) \(\text{normalcdf}(-0.75, 1E99, 0, 1) = 0.7734\)

(d) \(\text{normalcdf}(-1E99, 2.5, 0, 1) = 0.9938\)

(e) 0, since z is a continuous random variable.

(f) \(\text{normalcdf}(-1E99,-1,0,1) + \text{normalcdf}(1.15,1E99,0,1)\)

Answer: 0.2837

(g) \(A = \text{invnorm}(0.647,0,1) = 0.3772\)

(h) \(J=\text{invNorm}(1-0.791,0,1) = -0.8099\)

60. area not between \(A\) and \(-A\) is 1\(-0.76\) = 0.24

Area at each end of the graph is \(\frac{0.76}{2} = 0.12\)

\(A = \text{invnorm}(0.12+0.76,0,1) = 1.174986\)

61. (a) \(\text{normalcdf}(111,135,100,20) = 0.268478\)

(b) \(\text{normalcdf}(85,120,100,20) = 0.614717\)

(c) \(\text{normalcdf}(75,1E99,100,20) = 0.89435\)

(d) \(A = \text{invnorm}(0.42,100,20) = 95.96213\)

62. (a) \(\text{normalcdf}(144,156,140,8) = 0.285787\)
(b) \( \text{normalcdf}(130, 156, 140, 8) = 0.8716 \)
(c) \( \text{normalcdf}(-1E99, 148, 140, 8) = 0.8413447 \)
(d) zero since \( X \) is a continuous random variable
(e) \( B = \text{invnorm}(1-0.37, 140, 8) = 142.6548268 \)

63. (a) \( \mu + 1.5\sigma = 65 + 1.5 \times 6 = 74 \)
\( \mu - 1.5\sigma = 65 - 1.5 \times 6 = 56 \)
\( \text{normalcdf}(56, 74, 65, 6) = 0.8663855 \)
Answer: 86.63855%
(b) \( \mu + 2\sigma = 65 + 2 \times 6 = 77 \)
\( \text{normalcdf}(77, 1E99, 65, 6) = 0.02275 \)
Answer: 2.275%
64. st. dev = \( \sqrt{\text{var}} = \sqrt{225} = 15 \)
area to the left of \( X = 35 \)
\( \text{normalcdf}(-1E99, 35, 45, 15) = 0.2525 \)
Answer: \( A = \text{invnorm}(0.2525 + 0.4, 45, 15) = 50.8809 \)
65. area to the left of \( X = 50 \)
\( \text{normalcdf}(-1E99, 50, 50, 10) = 0.5 \)
Area to the right of \( B \) is
\( 1 - 0.5 - 0.48 = 0.02 \)
Area to the left of \( A \) is \( 1 - 0.75 - 0.02 = 0.23 \)
Answer: \( A = \text{invnorm}(0.23, 50, 10) = 42.6115 \)
66. \( \text{normalcdf}(-1E99, 112, 120, 10) = 0.2111855 \)
67. (a) \( \text{normalcdf}(27000, 1E99, 24000, 1400) = 0.01606 \)
(b) \( \text{normalcdf}(22500, 28000, 24000, 1400) = 0.85587 \)
(c) \( \text{binompdf}(4, 0.85587, 2) = 0.091301 \)
68. \( \sigma = 15 \times 24 = 360 \)
(a) \( \text{normalcdf}(8250, 1E99, 8000, 360) = 0.2437 \)
(b) \( \text{binompdf}(4, 0.2437, 4) = 0.003527 \)
(c) \( 400 \times 0.2437 = 97.48 \)
approximately 97
69. (a) \( \text{normalcdf}(28, 1E99, 20.5) = 0.0548 \)
(b) since the random variable is continuous, the probability that it takes exactly 20 minutes is zero.
(c) \( \text{normalcdf}(16, 26, 20.5) = 0.6731 \)
\( 500 \times 0.6731 = 336.55 \)
approximately 336 or 337.
70. \( \text{invnorm}(0.8, 10, 2.5) = 12.10405 \) minutes
71. (a) \( \text{normalcdf}(9.2, 1E99, 7.4, 1.2) = 0.0668 \)
(b) 0, since this is a continuous random variable
72. (a) minimum length = \( 1.001 - 2 \times 0.002 = 0.997 \)
maximum length = \( 1.001 + 2 \times 0.002 = 1.005 \)
(b) \( \text{normalcdf}(0.997, 1.005, 1.001, 0.002) = 0.9545 \)
Answer: 95.45%
(c) \( 10000 \times 0.0455 = 455. \)