

## Excercise Solutions

1. (a)  $y - 4 = 2(x - 3)$ , point-slope form

(b)  $y - 5 = \left(\frac{5 - (-1)}{-2 - 6}\right)(x - (-2)) \rightarrow y - 5 = \frac{-3}{4}(x + 2)$ , two-point form

You could also have used the other point to get  $y + 1 = \frac{-3}{4}(x - 6)$ .

(c)  $y = 3x - 4$ , slope-intercept form

2. The distance between (1,2) and (7,10) is  $\sqrt{(1-7)^2 + (2-10)^2} = \sqrt{100}$ . The distance between (1,2) and (5,-1) is  $\sqrt{(1-5)^2 + (2-(-1))^2} = \sqrt{25}$ . The distance between (7,10) and (5,-1) is  $\sqrt{(7-5)^2 + (10-(-1))^2} = \sqrt{125}$ . We see  $(\sqrt{100})^2 + (\sqrt{25})^2 = (\sqrt{125})^2$  so these points create a right triangle.

3. Put both equations in slope-intercept form.

- $y = \left(\frac{1}{k}\right)x - \frac{5}{k}$  with slope  $m = \frac{1}{k}$

- $y = -3x + \frac{7}{2}$  with slope  $m = -3$

For two line to be perpendicular one slope is the negative reciprocal of the other. Set  $\frac{1}{3} = \frac{1}{k}$ . Then  $k = 3$ .

4. I don't have a good way to draw graphs. One answer is in the book, see Sec. 8.2 number 11.

5. The operations are

1. multiply by 5 (or multiply by -5)
2. subtract from 3 (add 3)
3. cube
4. add 4

There are 5 children in line counting the one who receives the paper at the end.

6. (a)  $15 \div 3 = 5$  mph

(b) 1 hour

(c)  $3+1=4$  hours

(d)  $30 \text{ miles} \div 4 \text{ hours} = 7.5$  mph

(e) The average of the speed to, which is 5 mph, and the speed back, which is 15 mph, is  $10 \text{ mph} \neq 7.5$ .

- (f) The graph should show a line from (0,0) to (3,15) and from (3,15) to (4,0).
7. Suppose this is your data: {3, 5, 6, 4, 2, 4, 3, 6, 7, 0, 3, 4, 6, 3, 6, 1, 1, 5, 7, 4}.
- A relative frequency polygon should have the numbers 0 through 7 on the  $x$ -axis for the number of head which appear on a turn. The  $y$ -axis should have fractions for the relative frequency. There should be dots above each number on the  $x$ -axis corresponding to the relative frequency. For example, we should have the points  $(0, \frac{1}{20} = .05)$ ,  $(1, \frac{2}{20} = .10)$ ,  $(4, \frac{4}{20} = .20)$ , ect. Connect the dots with lines.
  - The mean is 4 and the standard deviation is about  $1.97 \simeq 2$ .
  - The range for one standard deviation is  $4-2$  to  $4+2$  which is between 2 and 6. 15 of our data values are between 2 and 6, that is 75%.
  - The range for two standard deviations is  $4-4$  to  $4+4$  which is between 0 and 8. 100% of our values are in this range.
  - This is not really very close to the 68-95-99.7 rule. It is a little tighter than a normal distribution. However is we used the decimal for the standard deviation instead of rounding up, it probably would be normal.
8. (a) mean = 19.875, median = 18.5, and mode = 18
- (b)  $Q_L$  is the median of {15, 17, 18, 18} which is 17.5.  $Q_U$  is the median of {19, 21, 24, 27} which is 22.5. The IQR =  $Q_U - Q_L = 22.5 - 17.5 = 5$ .
- (c) An outlier is either less than  $17.5 - 1.5(5) = 10$  or greater than  $22.5 + 1.5(5) = 30$ . There are no outliers.
- (d) The 5-number summary is 15-17.5-18.5-22.5-27. The box plot has a box between 17.5 and 22.5 with a line through 18.5 and lines from the sides of the box to 15 and to 27.
9. Yes, on a die there is an equal chance of rolling an even number or rolling an odd number.
10. (a) The limits are  $\mu - \sigma = 45 - 5 = 40$  and  $\mu + \sigma = 45 + 5 = 50$ .
- (b) The limits are  $\mu - 2\sigma = 45 - 10 = 35$  and  $\mu + 2\sigma = 45 + 10 = 55$ .
- (c) The limits are  $\mu - 3\sigma = 45 - 15 = 30$  and  $\mu + 3\sigma = 45 + 15 = 60$ .
- (d) The z-score for 33 is  $z = \frac{33 - \mu}{\sigma} = \frac{33 - 45}{5} = -2.4$ . The z-score for 46 is  $z = \frac{46 - \mu}{\sigma} = \frac{46 - 45}{5} =$
- (e) Use the table in the book. The percentile for 33 is .82 and for 46 is 57.93.
11. You would like the z-score of .5. This means your income is .5 standard deviations above average. A z-score of -1 implies your income is 1 standard deviation below average.