chap. 8 Skills Review worksheet

#1) 2, 3, 4, 7, 8, 8

mean: $\bar{x} = \frac{2+3+4+7+8+8}{6} = \frac{32}{6} = \frac{16}{3} = 5\frac{1}{3} = 5.3\overline{3}$

median: $\frac{4+7}{2} = \frac{11}{2} = 5.5$

mode: 8

#2) 8, 9, 12, 12, 13, 15, 16

mean: $\bar{x} = \frac{8+9+12+12+13+15+16}{7} = \frac{85}{7} = 12\frac{1}{7} \approx 12.143$

median: 12

mode: 12

#3) 7, 12, 18, 20, 31

mean: $\bar{x} = \frac{7+12+18+20+31}{5} = \frac{88}{5} = 17.6$

median: 18

mond: no mode

#4) $(0)(0.76) + (5)(0.16) + (20)(0.06) + (200)(0.02)$

$0 + .8 + 1.2 + 4$

expected value = 6

#5) 2, 3, 3, ~~4~~, 5, 6, 7

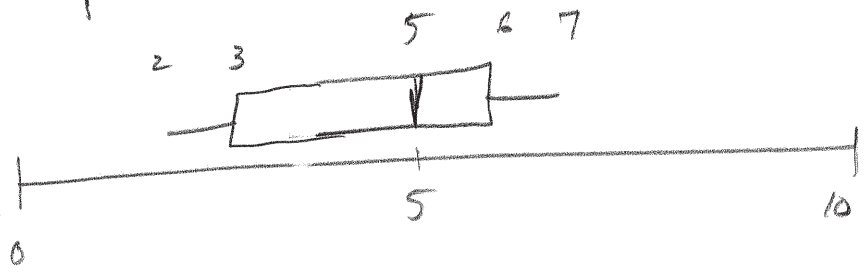
min = 2

Q1 = 3

median = 5

Q3 = 6

max = 7



IQR = 6 − 3 = 3

#6) 9, 10, 12, ~~15~~, 15, 16, 18

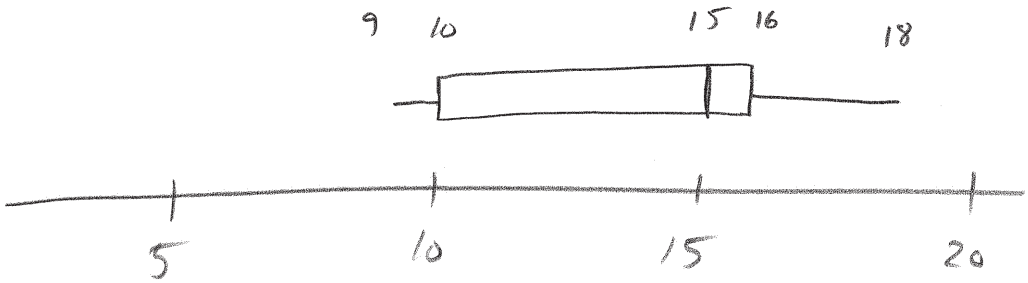
min = 9

Q1 = 10

median = 15

Q3 = 16

max = 18



IQR = 16 − 10 = 6

7) 8, 12, 10, 6, 9

$\bar{x} = \frac{45}{5} = 9$

$(8-9)^2 = 1$

$(12-9)^2 = 9$

$(10-9)^2 = 1$

$(6-9)^2 = 9$

$(9-9)^2 = 0$

$\text{Variance} = \frac{1+9+1+9+0}{5} = 4$

$\sigma^2 = \text{variance} = 4$

Standard deviation $\sigma = \sqrt{4}$

$\sigma = 2$

---

8) 14, 15, 10, 8, 12, 13

$\bar{x} = \frac{72}{6} = 12$

$(14-12)^2 = 4$

$(15-12)^2 = 9$

$(10-12)^2 = 4$

$(8-12)^2 = 16$

$(12-12)^2 = 0$

$(13-12)^2 = 1$

$\text{Variance} = \frac{4+9+4+16+0+1}{6} = \frac{34}{6} = \frac{17}{3} = 5\frac{2}{3}$

$\sigma^2 = \text{variance} = 5\frac{2}{3}$

Standard deviation $\sigma = \sqrt{5\frac{2}{3}}$

$\sigma = \sqrt{\frac{17}{3}}$

$\sigma = \frac{\sqrt{51}}{3}$

$\sigma = 2.3805$

9) 6, 33, 37, 28, 1

$\bar{X} = \frac{105}{5} = 21$

$(6-21)^2 = 225$

$(33-21)^2 = 144$

$(37-21)^2 = 256$

$(28-21)^2 = 49$

$(1-21)^2 = 400$

Variance $= \frac{225+144+256+49+400}{5}$

$\sigma^2 = \frac{1074}{5} = 214.8$

Standard deviation: $\sigma = \sqrt{214.8} \approx 14.6561$

10) No, math team members are more likely to think 4 years of math is a good idea. (biased)

11) Yes; if the intended population is cities, the selection is random

12) No, the sample is people who are more likely to enjoy reading online sources.

13) $\frac{63}{100} = \frac{x}{23000}$

$100x = 1449000$

$x = 14{,}490$ 14,490

14) experiment (has treatment group & control group)

15) observational study

16) It would be unethical to randomly assign people to live in a particular location. Perform an observational study:

compare the rate of allergies in people who live on farms to those who do not.

17) An experiment can be run without causing harm. Perform an experiment: make the recipe in two different ways and serve each to a different group of randomly assigned people.

18) H_0: there is no difference in the times of the new website and old website.

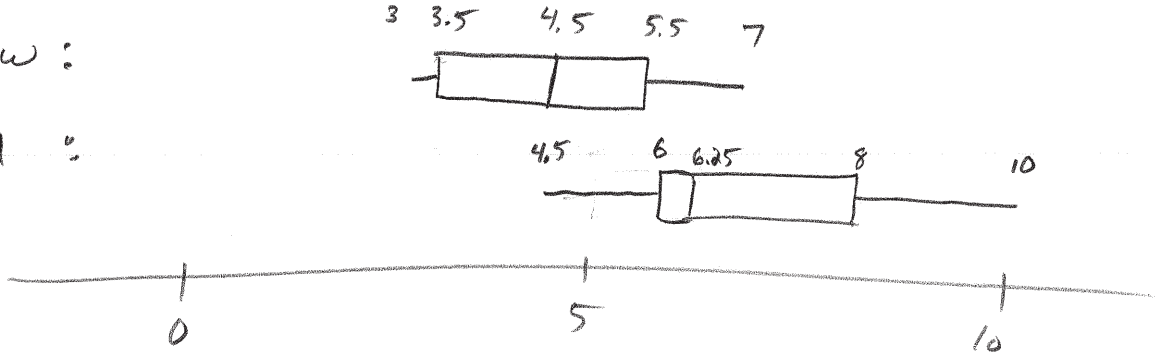
19)

New

3, 3, 3.5, 4, 4, 5, 5, 5.5, 6.5, 7

Old

4.5, 5, 6, 6, 6, 6.5, 8, 8, 9, 10



New: $\bar{x} = 4.65$ minutes

old: $\bar{x} = 6.9$ minutes

The difference is substancial, so reject the null hypothesis. The new website appears to be faster than the old one.

20) z-test

$$z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} \qquad z = \frac{45{,}000 - 50{,}000}{\frac{7000}{\sqrt{100}}} = \frac{-5000}{700} = -\frac{50}{7} \approx -7.14$$

Since $|z| > 1.96$ reject the null hypothesis. Reject the claim b/c it is -7 (lower than predicted)

Lesson 8-1

Find the mean, median, and mode of each data set.

1. $\{3, 7, 8, 2, 8, 4\}$
2. $\{12, 9, 8, 15, 16, 12, 13\}$
3. $\{7, 31, 20, 12, 18\}$

4. Find the expected value of the raffle prize. 6.00

Raffle Prizes				
Value	$0	$5	$20	$200
Probability	0.76	0.16	0.06	0.02

Make a box-and-whisker plot of the data. Find the interquartile range.

5. $\{3, 5, 7, 6, 5, 2, 3\}$
6. $\{12, 15, 18, 10, 9, 15, 16\}$

Find the variance and standard deviation.

7. $\{8, 12, 10, 6, 9\}$ $\sigma^2 = 4$ $\sigma = 2$
8. $\{14, 15, 10, 8, 12, 13\}$ $\sigma^2 = 5\frac{5}{6}$ $\sigma = 2.38$
9. $\{6, 33, 37, 28, 1\}$ $\sigma^2 = 214.8$ $\sigma = 14.66$

Lesson 8-2

Determine whether the survey is likely to be representative of the population.

10. A student asks the members of the math team whether math classes should be required for all four years of high school. No, members of the math team are more likely to favor requiring 4 years of math than the general student population.
11. A state sends out surveys to random city governments about the city's parking plans. Yes if the intended population is cities, the selection is random.
12. A website asks customers if they prefer to read news online or in a print magazine. No, the sample is people who are more likely to enjoy reading online sources
13. In a survey of 100 town residents, 63 said they prefer the library's new hours. If you were able to survey all 23,000 residents of the town, how many would you expect to prefer the library's new hours? 14,490

Lesson 8-3

Determine whether each situation is an experiment or an observational study.

14. A farmer wants to know if a new fertilizer affects the weight of the fruit produced by strawberry plants. She applies the fertilizer to 10 rows of plants and does not apply the fertilizer to 10 other rows of plants. experiment
15. A researcher compares incomes of people who live in rural areas with incomes of people who live in large cities. observational study

Explain whether each research topic is best addressed through an experiment or an observational study. Then explain how you would set up the experiment or the observational study.

16. Does living on a farm reduce allergies?
17. Does reducing the fat in a particular recipe make it less appealing?

Lesson 8-4

To test the redesign of its Web site, an online bookseller assembled users and randomly divided them into two groups. One group used the new Web site to make an online purchase and the other group used the old website to do the same transaction. The times for the transactions are shown below.

Time to Complete (minutes)

New Web Site	Old Web Site
3, 5, 6.5, 4, 7, 3, 4, 5, 5.5, 3.5	6, 8, 9, 4.5, 10, 6, 5, 8, 6.5, 6

18. State the null hypothesis. No difference
19. Compare the results of the two groups. Does the company have enough evidence to reject the null hypothesis?
20. A tire manufacturer claims that one brand of tires will last 50,000 miles. In a random sample of 100 tires, the mean was 45,000 miles with a standard deviation of 7000 miles. Is there enough evidence to reject this claim? $Z = -7.14$ $|Z| > 1.96$ reject the claim