

## Reading

- BPS Chapter 16

## Exercises

**BPS - Check your skills** Chapter 16 # 11-18. You do not need to turn these in.

**BPS** Chapter 16 # 19, 21, 25, 26.

1. baseball-reference.com has a record of every player to play professional baseball. Go to <http://www.baseball-reference.com/friv/random.cgi> to open a random page. Most of the time, you'll get a player's page, but if you don't, just click the link again.
  - (a) Take a sample of 10 random players, and record their weights.
  - (b) In this database, the population SD for weight is  $\sigma = 20.9$  lbs. Use your data to compute the 95% confidence interval for the mean weight of all baseball players.
  - (c) How large a sample would you need to compute the mean weight to within 1lb at 95% confidence?
  - (d) The population mean is  $\mu = 184.5$ . Does your confidence interval contain the mean?
  - (e) I got  $\mu$  and  $\sigma$  by taking a SRS of 1783 players. How accurate is my estimate of  $\mu$ ?

## Questions from the textbook

- 16.19 Student study times. A class survey in a large class for first-year college students asked, “About how many hours do you study during a typical week?” The mean response of the 463 students was  $\bar{x} = 15.3$  hours. Suppose that we know that the study time follows a Normal distribution with standard deviation  $\sigma = 8.5$  hours in the population of all first-year students at this university.
- (a) Use the survey result to give a 99% confidence interval for the mean study time of all first-year students.
- (b) What condition not yet mentioned must be met for your confidence interval to be valid?
- 16.21 An outlier strikes. There were actually 464 responses to the class survey in Exercise 16.19. One student claimed to study 10,000 hours per week (10,000 is more than the number of hours in a year). We know he’s joking, so we left out this value. If we did a calculation without looking at the data, we would get  $\bar{x} = 36.8$  hours for all 464 students. Now what is the 99% confidence interval for the population mean? (Continue to use  $\sigma = 8.5$ .) Compare the new interval with that in Exercise 16.19. The message is clear: always look at your data, because outliers can greatly change your result.
- 16.25 Pulling wood apart. How heavy a load (pounds) is needed to pull apart pieces of Douglas fir 4 inches long and 1.5 inches square? Data is available online for this exercise.
- (a) We are willing to regard the wood pieces prepared for the lab session as an SRS of all similar pieces of Douglas fir. Engineers also commonly assume that characteristics of materials vary Normally. Make a graph to show the shape of the distribution for these data. Does it appear safe to assume that the Normality condition is satisfied? Suppose that the strength of pieces of wood like these follows a Normal distribution with standard deviation 3000 pounds.
- (b) Give a 95% confidence interval for the mean load required to pull the wood apart.
- 16.26 Bone loss by nursing mothers. Breastfeeding mothers secrete calcium into their milk. Some of the calcium may come from their bones, so mothers may lose bone mineral. Researchers measured the percent change in mineral content of the spines of 47 mothers during three months of breastfeeding.
- (a) The researchers are willing to consider these 47 women to be an SRS from the population of all nursing mothers. Suppose that the percent change in this population has standard deviation  $\sigma = 2.5\%$ . Make a stemplot of the data to verify that the data follow a Normal distribution quite closely. (Don’t forget that you need both a 0 and a -0 stem because there are both positive and negative values.)
- (b) Use a 99% confidence interval to estimate the mean percent change in the population.