STAT22000, Autumn 2013 Homework 6

All page, section, and exercise numbers below are for the course text (Moore, McCabe and Craig, Introduction to the Practice of Statistics, 7th edition).

Reading: Section 5.2, 6.1 and 6.2
Problems for Self-Study: (Do Not Turn In. Solutions are at the end of the textbook.)

1. Exercise 5.63 on p.336
2. Exercise 6.13 on p.357
3. Exercise 6.27 on p.359

Problems to Turn In: due Wednesday, Nov. 13, in class

1. Exercise 5.62 on p.336.

   A selective college would like to have an entering class of 950 students. Because not all students who are offered admission accept, the college admits more than 950 students. Past experience shows that about 75% of the students admitted will accept. The college decides to admit 1200 students. Assuming that students make their decisions independently, the number who accept has the Bin(1200, 0.75) distribution. If this number is less than 950, the college will admit students from its waiting list.

   (a) What are the mean and the standard deviation of the number X of students who accept?

   (b) Use the Normal approximation to find the probability that at least 800 students accept.

   (c) The college does not want more than 950 students. What is the probability that more than 950 will accept?

   (d) If the college decides to increase the number of admission offers to 1300, what is the probability that more than 950 will accept?

2. Exercise 6.14 on p.357.

   Suppose 100 randomly selected members of MySpace Karaoke were asked how much time they typically spend on the site during the week. The sample mean ($\bar{x}$) was found to be 4.2 hours. Assume that the population standard deviation is known to be $\sigma = 2.5$.

   (a) Cary Oakey computes the 95% confidence interval for the average time on the site as $4.2 \pm 1.96(2.5/100)$. What is his mistake.

   (b) He corrects this mistake and then states "95% of the members spend between 3.71 and 4.69 hours a week on the site." What is wrong with his interpretation of this interval?

   (c) The margin of error is slightly less than a half hour. To reduce this down to 15 minutes, Gary says the sample size needs to be doubled to 200. What is wrong with this statement?

3. Exercise 6.34 on p.360

   To assess the accuracy of a laboratory scale, a standard weight known to weigh 10 grams

is weighed repeatedly. The scale readings are Normally distributed with unknown mean (this mean is 10 grams if the scale has no bias). The standard deviation of the scale readings is known to be 0.0002 gram.

(a) The weight is measured five times. The mean result is 10.0023 grams. Give a 98% confidence interval for the mean of repeated measurements of the weight.

(b) How many measurements must be averaged to get a margin of error of ± 0.0001 with 98% confidence?