Homework 01

Psychology 310

1. Professor Pretorius gives an exam that is too difficult. The class average is 55 and the standard deviation is 18. The typical grading standards at his university are an average grade of 78 and a standard deviation of 12. What linear transformation of the form $Y = aX + b$ will transform his grades into the desired metric?

2. Marlon is TAing for Professor Pretorius in Psychology 666, and there are two sections. Section 01 has 21 students, a mean of 74.7 and a standard deviation of 14.4. Section 02 has 32 students, a mean of 72.9 and a standard deviation of 16.2. Marlon gets a call from Professor Pretorius, telling him to combine the two sections into one large group of 53. What will be the mean and standard deviation of this large combined group?

3. An early research study attempted to calculate "the monetary value of a higher education" by simply calculating the average income of a large sample of people who complete a 4 year college degree and comparing this average to the average income of a large sample of people who have no college education. The implication is that the college education is responsible for the difference in income.

   (a) What is the independent variable?

   (b) What is the dependent variable?

   (c) Name 3 variables other than "higher education" that might vary in an important way between the "higher education" and "no higher education" groups in this study. These variables are called "confounds." Briefly explain why some confounds might seriously compromise the conclusion that college education is primarily responsible for the difference in income.

4. Do RDASA3, Chapter 2, problem 2.6.

5. Different varieties of the tropical flower *Heliconia* are fertilized by different species of hummingbirds. Over time, the lengths of the flowers and the form of the hummingbirds' beaks have evolved to match each

other. Data (lengths in *mm*) for the 3 varieties on the island of Dominica are found in the file `http://www.statpower.net/Content/310/Homework/HW01/heliconia.csv`. The varieties are *H. bihai, H. caribaea red,* and *H. caribaea yellow*.

(a) Extract the *H. bihai* data from the data frame. Compute the mean and standard deviation for *H. bihai* flowers.

(b) Produce a boxplot, stem leaf diagram, and histogram for the *H. bihai* flowers. Based solely on the appearance of these plots, would you describe the distribution of the flower lengths as symmetric, positively skewed, or negatively skewed?