STATISTICAL METHODS II
ASSIGNMENT 02
DUE: 25 JANUARY 2011
(VERSION 2)

This homework assignment deals with problems concerning comparing means. Please make sure you read the questions thoroughly and think about them *before* you begin your answer. Two of the three questions use real data. As always, you will need to use `R` to answer it. Download the data sets from the web site. The filenames are given in the individual problems.

Your answers to the questions must be nicely typed. The answer should be at least paragraph in length and should follow the same pattern in what information is included:

- State the problem.
- State the null and alternative hypotheses in words.
- State the test you will use, its assumptions, and why you chose this test.
- In your answer, include the value of the test statistic, the degrees of freedom (if applicable), and the calculated p-value.
- Clearly draw the appropriate conclusion.

When you hand in this assignment, attach your `R` script to the back of the pages.

If you have any questions or issues, let me know as soon as possible.

Good luck!

Problem 02.1 [[3]]

Last week, my SEC friend watched the Auburn game (to him, there was no one else on the field). At the end of the game, he concluded that the SEC is the best conference in the nation, if not the world. When pressed, he offered as evidence that the average number of points scored by SEC teams is larger than that of any other conference, *especially* the Big 12. For the year 2009, I ran the data for the regular season and discovered that the SEC averaged 29.15 points per game, while the Big 12 averaged 29.85 (I used the `football` dataset).

Faced with this evidence, he gracefully admitted he was wrong and that the Big 12 was better than the SEC. Alright — he didn't. Instead, he became defensive and said that I was making up the numbers.

However, let us test whether the Big 12 is *statistically* better than the SEC in terms of average points scored per game. Notice that we now have the following two hypotheses:

$$H_0 : \mu_{\text{SEC}} \geq \mu_{\text{Big 12}}$$

$$H_A : \mu_{\text{SEC}} < \mu_{\text{Big 12}}$$

As we are comparing two means, let us use a t-test. The data are not paired, so we use a standard one-tailed t-test. (Why one-tailed?)

What is our conclusion?

Problem 02.2 [[3]]

Last week, a professor I know made the statement that Africa is more poor (has a lower GDP per capita) than Asia. This seems to be the common wisdom. However, it is true? Using the dataset `gdpcap`, determine if common wisdom is correct; that is, determine if the Africa region has a significantly lower GDP per capita than does the Eastern region.

Problem 02.3 ⟦4⟧

At a certain SEC university, there was a great debate between the members of two rival fraternities as to which was smarter. I'm not sure that answer can be determined, as "smarter" has many different meanings. However, since having too low of an average grade point average (GPA) can put the fraternity on double secret probation, let us use this value to compare the two fraternities.

Using the `fraternity` data set, determine if the members of XP and AO had statistically different GPAs in 2007. Provide an appropriately labeled boxplot to illustrate your conclusions.