Statistics 630 - Assignment 1
(due Wednesday, September 10, 2014, 11:59 pm)

Instructions:

- The textbook exercises are in the book by Evans and Rosenthal. This assignment covers material from Lectures 01–03.

- Whether you write out the solutions by hand or in a text document, be sure that they are *neat, legible and in order* (even if you choose to solve them in a different order).

- **Type** your name, email address, course number, section number and assignment number at the top of the first page (or cover page).

- Either scan or print your solutions to a **PDF** file under 15MB in size. It must be in a *single* file, not separate files for separate pages. Name the file using your name (for example, I could use twehrly630hw01.pdf) to avoid confusion with other students and/or assignments. *Do not* take a photo of each page and then paste them into a document – this will make your file too big and the results will generally not be very readable anyway.

- Login to your WebAssign account to upload your file. You must do this by **11:59 pm U.S. Central time**, *according to the WebAssign server*, on the due date. We highly recommend that you start the upload at least 15 minutes earlier. You can make multiple submissions, but *only the last submission will be graded*.

Answer the following problems from Chapter 1:

1.2.3 (Also, what is P(3)?), 1.2.6, 1.2.12

1.3.2, 1.3.8, 1.3.10a

1.4.1, 1.4.4, 1.4.11, 1.4.12

1.5.3, 1.5.7, 1.5.10

Answer these additional problems:

A. Two distinguishable 6-sided dice (red and green) are thrown and the values they show are recorded.

   (a) List the sample space. (There are 36 outcomes.)
   (b) List the outcomes that make up the following events: $A =$ "the sum of the two values is at least 9", $B =$ "the value of the red die is higher than the value of the green die" and $C =$ "the green die has value 4".

(c) List the elements of the following events: $A \cap C$, $B \cup C$, $A \cap (B \cup C)$.

(d) Assume the outcomes are equally likely (they each have the same probability) and find the probabilities of the events in part (c).

(e) Can $P(A \cap C)$ be computed by multiplying the probabilities of A and C?

(f) Imagine this experiment being repeated many times. What would be the long-term proportion of all the experiments for which the sum of the two dice is 7?

B. Assume that grades are posted according to the last 4 digits of one's social security number ranging from 0000 to 9999 (I did this many years ago, but now this would be illegal).

(a) Use R to estimate the probability that at least two students in a class of 100 share the same ID.

(b) Find the actual probability and compare it to your estimate (recall the birthday problem discussed in lecture).

(c) What is the smallest class enrollment for which the probability that at least two students have the same ID numbers is at least 0.5?