Statistics 630 - Assignment 6
(due Wednesday, October 22, 2014, 11:59 pm)

Instructions:

- The textbook exercises are in the book by Evans and Rosenthal. This assignment covers material on expectations from Chapters 3 and 4 discussed in Lectures 17–20.
- 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 3:

3.5.4, 3.5.11ace, 3.5.16

3.6.3
3.6.3 (e) Compute the exact probabilities for parts (a), (b), and (c), and compare the bounds in parts (a), (b), and (c) to the exact probabilities.

3.6.11
3.6.11 (c) Compute the exact probability for part (b), and compare the bound in part (b) to the exact probability.

Additional Problems for Chapter 3:

A. Suppose that X and N are distributed as described in the example on Slides 65 and 66 of Chapter 3. Show that X has a Poisson $(\lambda\theta)$ distribution in either of two ways: i) by deriving the pmf of X or ii) by deriving the mgf of X.

B. Let T have an exponential (λ) distribution, and conditional on T, let U be uniform on $[0, T]$. Find the unconditional mean and variance of U.

Answer the following problems from Chapter 4:

4.1.11 (Use the **rnorm** and **max** functions in R. Feel free to use larger N.)
4.1.11 (b) Also construct a histogram for the sample of maxima and describe its shape.
4.1.11 (c) Carry out the instructions in (a) using samples of size 20 instead of 10.
4.1.11 (d) Construct a histogram for the sample of maxima in (c) and describe its shape.

4.2.2, 4.2.10
4.2.12 (Use the **rexp** and **mean** functions in R.)

4.4.4, 4.4.6, 4.4.12

4.4.12
(d) Determine the exact distribution of the average time to service for for the first n customers for $n = 16$. (Hint: use the mgf). Then use the function pgamma in R to find the exact probability and compare it to the normal approximation.
(e) Same as (d) except for $n = 36$.
(f) Same as (d) except for $n = 100$.

4.4.16

4.5.14 (follow the steps in example 4.5.3)