Statistics 630 - Assignment 8
(due Wednesday, November 5, 2014, 11:59 pm)

Instructions:

- The textbook exercises are in the book by Evans and Rosenthal. This assignment covers the material on maximum likelihood from Chapter 6 discussed in Lectures 23–26.
- 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 6:

6.1.7, 6.1.19 (For both of these problems, find a nontrivial sufficient statistic. You do not need to prove that it is minimal sufficient.)

6.2.4

6.2.4(b) Evaluate the bias, variance, and MSE of this estimator.

6.2.5

6.2.5(b) Evaluate the bias, variance, and MSE of this estimator.

6.2.5(c) Use E(X) to derive a method-of-moments estimator. Is it the same as the mle?

6.2.6

6.2.6(b) Use E(X) to derive a method-of-moments estimator. Is it the same as the mle?

6.2.8

6.2.12 (The plug-in mle of the variance is given at the top of page 315.)

6.2.12(b) Evaluate the bias, variance, and MSE of this estimator. Compare the MSE to that of S^2 and $\hat{\sigma}^2$ from Example 45 (see slides 46-48).

6.2.19

6.3.15, 6.3.24

Additional problem: In the classroom example where $X_1, ..., X_n$ form a random sample from an exponential (λ) distribution, define the estimator $T_C = C/\sum_{i=1}^{n} X_i$ where C is some constant. Find the value of C that results in the estimator of this form with the smallest mean squared error as an estimator of λ.