Homework 1 – Due 12 am CST, 29 January 2012

The total points on this assignment is 50. The problems numbers correspond to the book. Datasets are posted on the class website.

1. **Problem 2.23** [5 points]

2. **Problem 2.28** [5 points]

3. Using results from the spectral decomposition theorem for positive-definite matrices and multivariable calculus, show that the identity matrix $I_p$ is the one among all $p \times p$-dimensional positive definite matrices $B$ that maximizes

$$f(B) = |nB|^{n/2} \exp \left\{ -\frac{n}{2} \text{trace}(B) \right\}.$$  \hfill (1)

[10 points]

4. **Problem 1.6** and the following: Investigate empirically if there is an effect on air pollution with wind and the sun. To do this, we will divide the observations into four groups consisting of windy/not as windy and sunny/not as sunny using whatever limits you think are appropriate. (Do mention how you came up with these limits though.) Now, obtain appropriate graphical displays (your choice of plots to turn in) of the observations in each of these four groups and draw conclusions. You may also compute sample means and variances-covariances, etc. to get some quick summaries. [15 points]

5. **Problem 1.17, 1.18** and the following: Use appropriate graphical display(s) to represent the data. Comment. [15 points]