THE UNIVERSITY OF MINNESOTA

Statistics 5401 November 28, 2005

Assignment 8

Reading

Week of November 28 - December 2 J&W, Chapter 11
Week of December 5 - 9 J&W, Sec. 12.1-12.3
Week of December 12 - 14 J&W, remainder of Chapter 12

Final Examination: A **take home** final examination will be handed out in the next to final class, Monday, December 12. It will be due by 12 noon on Tuesday December 20.

Written Assignment (due in class Monday, December 5)

1. Further analysis of the data from Table 9.12 on page 539-540 of Johnson and Wichern in matrix `T09_12` in file `JW5Data.txt`. Group the 7 variables in two sets, $\mathbf{x}^{(1)}$ containing first 3 variables, and $\mathbf{x}^{(2)}$ containing the remaining 4 variables.

(a) Find the correlation matrix between multi-standardized versions of $\mathbf{x}^{(1)}$ and $\mathbf{x}^{(2)}$ and find the best rank 1 approximation to it and the canonical correlations (singular values) (see the notes for Lecture 31).

(b) Starting from the sample variance matrix of all the variables, compute the canonical correlations between the first 3 and the last 4 variables. Verify numerically their relationship to the relative eigenvalues of **H** relative to **E** in a multivariate regression of $\mathbf{x}^{(1)}$ and $\mathbf{x}^{(2)}$.

(c) Test the hypothesis of independence of these two sets of variables using bonferronized correlation coefficients and the likelihood ratio (Wilks) test.

(d) Find the coefficients of the two sets of canonical variables and use them to compute the canonical variables. Make scatter plots of each pair of canonical variables. Verify numerically that the sample correlation matrix of the canonical variables is of the form $\begin{bmatrix} \mathbf{I}_3 & \mathbf{D} \\ \mathbf{D} & \mathbf{I}_3 \end{bmatrix}$, where **D** is the diagonal matrix of the estimated canonical correlations.

2. Analysis of J&W Ex. 10.11 (p. 576). Data are in Table 8.4, p. 469 of J&W and are in data set `T08_04` in file `JWData5.txt`.