Due Wednesday, October 3rd, 2007

1. Manipulating matrices and arrays in R:
   (a) Generate a 10 × 20 matrix $A$ with $A_{ij} = i + 2j$.
   (b) Calculate the means for each row of $A$ and store them in a vector of length 10 with one single command. (Hint: try `apply`.)
   (c) Transform $A$ into a 10 × 10 × 2 array with one single command.
   (d) Replace any $A_{ijk} \leq 10$ by 206 with one single command. (Hint: try `which`.)

2. QR-decomposition:
   Let
   \[
   X = \begin{bmatrix}
   1 & 1 & .5 \\
   1 & .5 & 1 \\
   1 & 1 & 1 \\
   \end{bmatrix}, \quad y = \begin{bmatrix}
   1 \\
   2 \\
   3 \\
   \end{bmatrix}.
   \]
   (a) Look up the help for the $QR$-decomposition in R by typing: `help(qr)`.
   (b) Find the $QR$-decomposition of $X$.
   (c) Solve $X\beta = y$ using the results in (b).

3. Graphics in R:
   (a) Generate a sample of size 1000 from a standard Gaussian distribution, report the sample mean and variance.
   (b) Plot a histogram of the sample.
   (c) Plot a QQ-plot of the sample.
   (d) Generate a sample of size 1000 from a uniform distribution on [0, 1] and plot a QQ-plot for this sample.
   (e) Compare the two QQ-plots.

4. After class reading assignment:
   To get familiar with R, you will find the R manual An Introduction to R helpful. It is available at
   Please read at least the first 6 chapters and try out all the commands in Appendix A.