

Due Wednesday, October 3rd, 2007

1. Manipulating matrices and arrays in R:

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

2. QR-decomposition:

Quick reference:

http://en.wikipedia.org/wiki/QR_decomposition.

Let

$$X = \begin{bmatrix} 1 & 1 & .5 \\ 1 & .5 & 1 \\ 1 & 1 & 1 \end{bmatrix}, \quad y = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}.$$

- Look up the help for the QR -decomposition in R by typing: `help(qr)`.
- Find the QR -decomposition of X .
- Solve $X\beta = y$ using the results in (b).

3. Graphics in R:

- Generate a sample of size 1000 from a standard Gaussian distribution, report the sample mean and variance.
- Plot a histogram of the sample.
- Plot a QQ-plot of the sample.
- Generate a sample of size 1000 from a uniform distribution on $[0, 1]$ and plot a QQ-plot for this sample.
- 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

<http://cran.r-project.org/doc/manuals/R-intro.pdf>.

Please read **at least** the first 6 chapters and try out all the commands in Appendix A.