Assignment 1, due 5pm Thursday 18 March

- Your assignment needs to show the R code you used, and your well discussed answers to the questions (in Word, or some other word processor).
- Submit your assignments on Learn.

Question 1

Use the data in the file, bodyfat.txt to explore what are useful predictors of body fat. The data is percentage of body fat, age, weight, height, and body circumference measurements (e.g., abdomen) are recorded for 252 men. Body fat, a measure of health, is estimated through an underwater weighing technique. This is time consuming and expensive to undertake and it would be preferable to be able to estimate it with easy-to-measure variables which use only scales or a measuring tape.

The variables in the file, bodyfat.txt, are:
Person Number
Percent body fat
Age (yrs)
Weight (lbs)
Height (inches)
Neck circumference (cm)
Chest circumference (cm)
Abdomen circumference (cm)
Hip circumference (cm)
Thigh circumference (cm)
Knee circumference (cm)
Ankle circumference (cm)
Extended biceps circumference (cm)
Forearm circumference (cm)
Wrist circumference (cm)

Keeping in mind the research question, use summary statistics and graphs to explore the data.
  a. What measures are well correlated with body fat? Create a correlation and matrix plot to display this information.
  b. By looking at the graphs and correlations, what are the two most useful measures of body fat?
  c. Create a sensible 3-D plot with these two measures and body fat. Describe what information is in the graph.
  d. Use the variable age to group the data into two age-groups (you can choose what these groups are). Use side-by-side box plots, or some better graphic, to compare body fat between the two age-groups.
  e. Revisit your correlation analysis when the data was looked at altogether, and repeat this analysis for the two groups separately. Do any of your findings change when the age groups were looked at separately?

Question 2

For the matrix $A = \begin{bmatrix} 6 & -1 \\ 2 & 3 \end{bmatrix}$ find the Determinant, the Inverse, the Eigenvalues and the Eigenvectors.

Show your working. You can verify your answers in R but in your submission, but show you have worked through the problem mathematically by hand – if you literally use a pen and paper just take a photo of it and insert it in your report. Please write this as tidy as you can.

Question 3

Repeat question 2, but now with the 3 x 3 matrix $B = \begin{bmatrix} 2 & -3 & 1 \\ 2 & 0 & -1 \\ 1 & 4 & 5 \end{bmatrix}$