STA6329 Exercise 3 Due September 16 (Wednesday, Before class)

1. Suppose by a sequence of elementary row operations $\boldsymbol{E}_1$, $\boldsymbol{E}_2$,...,$\boldsymbol{E}_n$, we can transfer a square matrix $\boldsymbol{A}$ into a matrix $\boldsymbol{B}$ which has a row of all zeros, i.e.,

$$\boldsymbol{E}_n \cdots \boldsymbol{E}_2 \boldsymbol{E}_1 \boldsymbol{A} = \boldsymbol{B},$$

where $\boldsymbol{B}$ has a 0 row. Show that there is no way we can find another sequence of elementary row operations to transfer $\boldsymbol{A}$ into the identity matrix. (Hint: Show first that elementary row operations cannot change the independence-dependence status of row vectors in the matrix it operates on.)

2. Problem 1 of Chapter 3 (p.26).

3. Problem 2 of Chapter 3 (p.26). Please change the word "matrix" to "vector" .

B) R Exercises: (Hand in R program and outputs.)

4. Plot the data "smoking.txt" in the data set and add the regression line. Let the smoking rate be the x-axis and lung cancer rate be the y-axis. Give a title and descriptions at the two axes. (The difference in smoking and lung cancer among various professions of England in 1970-72 was one of the earliest evidences that smoking might cause lung cancer.)

5. Plot the 3-D picture for

$$f(x,y) = (x\sin(20y)+y\sin(20x))^2\cosh(\sin(10x)x)+(x\sin(10y)-y\sin(10x))^2\cosh(\cos(20y)y)$$

for $x\epsilon[-1,1], y\epsilon[0,1]$. Adjust the scales so graph looks good. (Note: R has cosh() function. The purpose of this exercise is to show how difficult it is to find the maximum without a good initial value.)