Problem Set #3

ECON 407: Mathematical Economics

(**due next class**)

1. (a) Give the dimensions of each of the following matrices. (b) Give their transposes and indicate their new dimensions.

2. Let , where is the identity matrix.

a) Does have to be a square matrix by the rules of conformability? Explain why or why not.

b) Does have to be a square matrix? Explain why or why not.

c) Show that matrix is idempotent (i.e., ). **Hint**: multiply out and simplify using properties of the identity matrix and inverses.

3. Consider the situation of a mass layoff (i.e., a factory shuts down) where 1,200 people become unemployed and now begin a job search. In this case there are two states: employed (*E*) and unemployed (*U*) with an initial vector,

Suppose that in any given period an unemployed person will find a job with probability 0.7 (thus, remaining unemployed with a probability of 0.3). Additionally, an employed person in any given period has a probability of 0.1 that they are fired (thus, having a 0.9 probability of keeping their job).

a) Setup the Markov transition matrix for this problem.

b) How many people will be unemployed after (i) 2 periods?; (ii) 3 periods?; (iii) *n* periods?

4. Let,

Compute the following if it is defined:

a)

b)

c)

d) Is matrix invertible? Explain why or why not.