1. Consider Ex. 2, p.296 Lay. The stochastic matrix for this problem is

$$P = \begin{pmatrix} .50 & .25 & .25 \\ .25 & .50 & .25 \\ .25 & .25 & .50 \end{pmatrix}$$

- (a) Type \mathbf{P}^2 to calculate P^2 .
- (b) Use P and P^2 to answer the following questions. Suppose an animal chooses food #1 on the initial trial. What is the probability that the animal will:
- (i) choose food #2 on the next trial?
- (ii) choose food #2 on the second trial after the initial trial ?
- (iii) choose food #3 on the second trial after the initial trial ?
- (c) Type I=eye(3), rref(P-I)to calculate the reduced echelon form of P-I. Record this and use it to write the general solution \mathbf{x} to the system $(P-I)\mathbf{x} = \mathbf{0}$. Also choose a nonzero value for the free variable and write a <u>particular solution</u> \mathbf{w} . To calculate the steady state vector \mathbf{q} for P enter your solution \mathbf{w} and type $\mathbf{q}=\mathbf{w}/\mathbf{sum}(\mathbf{w})$. Explain why \mathbf{q} is a probability vector and verify that \mathbf{q} satisfies $P\mathbf{q} = \mathbf{q}$.
- 2. Ex.4, p.296, *Lay* Also answer the following question. In the long run what is the probability that the weather will be good on any given day? (Show all calculations.)
- 3. Ex.21, p.297 *Lay.* In part (a) to compute the steady state vector write **R=rref(P-eye(4))** Then

 $w = [-R(1:3,4);1], \ q = w/sum(w)$