# Review for the Final Exam

8/16/2006

In the Land of Oz example, change the transition matrix by making $R$ an absorbing state. This gives

$$\mathbf{P} = \begin{array}{c c} & \begin{array}{ccc} \mathsf{R} & \mathsf{N} & \mathsf{S} \end{array} \\ \begin{array}{c} \mathsf{R} \\ \mathsf{N} \\ \mathsf{S} \end{array} & \begin{pmatrix} 1 & 0 & 0 \\ 1/2 & 0 & 1/2 \\ 1/4 & 1/4 & 1/2 \end{pmatrix} \end{array} .$$

Find the fundamental matrix **N**, and also **Nc** and **NR**. Interpret the results.

Assume that, at that time, 80 percent of the sons of Harvard men went to Harvard and the rest went to Yale, 40 percent of the sons of Yale men went to Yale, and the rest split evenly between Harvard and Dartmouth; and of the sons of Dartmouth men, 70 percent went to Dartmouth, 20 percent to Harvard, and 10 percent to Yale. Then the Markov chain has the transition matrix

$$P = \begin{array}{c} \\ \mathsf{H} \\ \mathsf{Y} \\ \mathsf{D} \end{array} \!\!\begin{array}{c} \begin{array}{ccc} \mathsf{H} & \mathsf{Y} & \mathsf{D} \end{array} \\ \begin{pmatrix} 1 & 0 & 0 \\ .3 & .4 & .3 \\ .2 & .1 & .7 \end{pmatrix} \end{array} .$$

Find the probability that the grandson of a man from Dartmouth went to Harvard.

It seems that in the video game *Nibbles*, the moments of time at which dots appear are Poisson-distributed, with red dots averaging 5 per minute and yellow dots 2 per minute.

1. What is the probability that no yellow dot appears in the next 2 minutes?

2. What;s the probability that exactly 3 red dots occur in the next minute?

Let $c$ be a constant and $X$ and $Y$ two random variables with finite range. For each of the following statements, say when the statement would be true.

1. $E(X+Y) = E(X) + E(Y)$.

2. $V(X+Y) = V(X) + V(Y)$.

3. $E(cX) = cE(X)$.

4. $V(cX) = cV(X)$.