**Math 367** **Sample Questions** **Fall '99**

1. Fred goes to the casino with \$100. He decides he's going to keep betting, \$1 at a time for even money, on a game where he has a probability of .47 of winning, until his money runs out. How long can he expect to play?

2. Peter bets \$1 at a time for even money on a game he has a probability of .41 of winning. If you give him unlimited credit, what is the probability he'll ever get \$10 ahead?

3. Consider the transition matrix

$$\begin{bmatrix} \frac{1}{2} & \frac{1}{2} & 0 & 0 & 0 & 0 & 0 & 0 \\ \frac{1}{3} & \frac{1}{3} & \frac{1}{3} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{4} & 0 & 0 & \frac{1}{2} & \frac{1}{4} & 0 \\ 0 & \frac{1}{4} & 0 & \frac{1}{4} & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{2} & 0 & 0 & \frac{1}{2} \\ 0 & 0 & 0 & 0 & 0 & \frac{1}{2} & \frac{1}{2} & 0 \\ 0 & 0 & \frac{1}{2} & 0 & 0 & 0 & \frac{1}{2} & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \end{bmatrix}$$

   a) Find $R_i$ for each state $i = 1, \ldots, 8$.
   b) Classify the recurrent and the transient states.
   c) Compute $h_{43}$.
   d) Compute $h_{45}$.
   e) Compute $v_{12}$.
   f) Compute $r_{13}$ and $r_{23}$.
   g) For each transient state, compute the expected number of steps needed to reach a recurrent state.