# Massachusetts Institute of Technology 

Department of Electrical Engineering \& Computer Science
6.041/6.431: Probabilistic Systems Analysis
(Spring 2006)

## Tutorial 12 Answers

## Markov Chains: Steady State Behavior and Absorption Probabilities

 May 11 \& 12, 20061. See online solutions.
2. (a) $J$, is a geometric random variable with success probability equal to 0.5 . The variance for $J$ is given by:

$$
\sigma_{J}^{2}=\frac{1-p}{p^{2}}=2
$$

(b) If you assumed that $\pi_{i}$ denoted steady state probabililties, then these probabilities do not exist.
(c) The probability of getting absorbed to the first recurrent class is 1 , and to the second recurrent class is 0 . Hence, the steady state probabilities now exist and they are given by,

$$
\begin{gathered}
\pi_{1}=\frac{4}{5} \cdot 1=\frac{4}{5} \\
\pi_{2}=\frac{1}{5} \cdot 1=\frac{1}{5} \\
\pi_{3}=\pi_{4}=0
\end{gathered}
$$

