ISYE 3232A Spring 2016 Quiz 6

March, 2016

Name: _____

A discrete-time Markov chain $X = \{X_n : n = 0, 1, 2, \ldots\}$ has state space $S = \{1, 2\}$, transition matrix

$$\underline{P} = \begin{bmatrix} 0.5 & 0.5 \\ 1 & 0 \end{bmatrix}.$$

1. (10 points) What is $\Pr(X_2 = 1 \mid X_0 = 1)$?

$$.5(.5) + .5(1) = .75.$$

2. (10 points) Set up all equations necessary to calculate stationary distribution $\underline{\pi}$. Just set them up. Do not attempt to solve them.

$$\pi_1 = .5\pi_1 + 1\pi_2$$
$$\pi_1 + \pi_2 = 1$$

3. (10 points) Suppose that the solutions to Problem 2 is $\underline{\pi} = (2/3, 1/3)$. If we observe this DTMC 10,000 times (i.e., up to $n = 10000$), how many times do we expect to see state 1 on average?

   We expect to visit the state $10000 \times 2/3 \approx 6667$ *times.*