Assignment 3.

Given Mon., Jan. 26, due Fri., Jan. 30.

Objectives: To practice using Markov chains in a fun application.

(1) Consider a very simplified game of baseball. There is only one base (in addition to home plate), a team gets only two outs, and the team wins if it scores two runs. The team has two hitters, A and B, and over the years their statistics show the following likelihood of their hitting a homerun, making a base hit, or making an out:

Player	homerun	base hit	out
A	.1	.3	.6
B	.2	.1	.7

There are 11 possible states for the system, if we list runs, outs, and number of players on base:

states	(runs,outs,onbase)
1	(0,0,0)
2	(0,0,1)
3	(0,1,0)
4	(0,1,1)
5	(0,2,*)
6	(1,0,0)
7	(1,0,1)
8	(1,1,0)
9	(1,1,1)
10	(1,2,*)
11	(2,*,*)

If the team scores 2 outs before it scores 2 runs, then it loses, while if it scores 2 runs, it wins. Thus states 5, 10, and 11 are absorbing states — once the game is in one of these states it stays in that state. The game starts in state 1. If player A hits first, for example, then the probability of going from state 1 (no runs, no outs, no one on base) to state 2 (no runs, no outs, 1 on base) is .3, while the probability of going from state 1 to state 3 (no runs, 1 out, no one on base) is .6, and the probability of going from state 1 to state 6 is .1. The probability of going from state 1 to any other state is 0.

(a) Write down the transition matrix for each player.

(b) What is the probability of winning if player A bats first and then B (followed by A again, then B again, etc., until the game ends). What is the probability of winning if player B bats first and then A? You will need to use MATLAB or another programming language to do the necessary computations. Turn in a listing of your code along with your answers.