18.06 Problem Set 7

Due Wednesday, April 18, 2007 at **4:00 p.m.** in 2-106

Problem 1 *Wednesday 4/11*

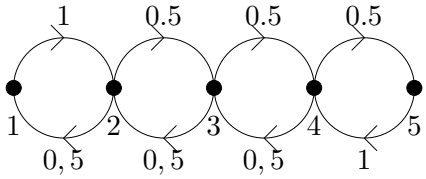
Do problem 9 of section 8.3 in your book.

Problem 2 *Wednesday 4/11*

Do problem 12 of section 8.3 in your book.

Problem 3 *Wednesday 4/11*

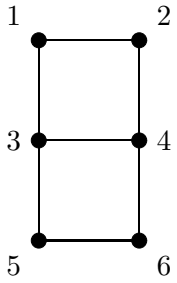
Consider the random walk on the directed graph shown below. More precisely, there are 5 nodes and $Prob(i, i+1) = Prob(i, i-1) = 1/2$ for $i = 2, 3, 4$; and $Prob(1, 2) = Prob(5, 4) = 1$. Here $Prob(i, j)$ is the probability to go from the i-th node to the j-th node.



Find the eigenvalues and the steady state distribution for this Markov chain.

Problem 4 *Wednesday 4/11*

Consider the 3×2 grid shown below. Assume an ant starts in vertex 1. At every step, if the ant is in vertex i, it either stays where it is with probability $\frac{1}{2i}$ or moves to an adjacent vertex selected uniformly among the current neighbors.



(a) What matrix A represents this Markov Chain?
(b) What is the sum of the eigenvalues of A?
(c) Use `MATLAB` to compute the eigenvalues of A.
(d) What is the steady state? What is the probability that in the steady state the ant is on vertex 6?

Problem 5 *Friday 4/13*

Do problem 2 of section 8.5 in your book.

Problem 6 *Friday 4/13*

Do problem 12 of section 8.5 in your book. You don't have to write the "differentiation matrix" (this involves concepts of chapter 7 that you haven't learned yet).

Problem 7 *Friday 4/13*

Do problem 1 of section 10.2 in your book.

Problem 8 *Friday 4/13*

Do problem 10 of section 10.2 in your book.

Problem 9 *Friday 4/13*

Do problem 16 of section 10.2 in your book.

Problem 10 *Friday 4/13*

Do problem 17 of section 10.2 in your book.