02/12/2026: Markov Chains (Part 2)

CSCI 546: Diffusion Models

Textbook reference: Sec 6.3-6.4

Announcement (Sign-in Sheet)

Please sign the sign-in sheet.

Review Problem Set #8

Concepts for Problem Set #9

Random Groups

Aubrey Williams: 5
Austin Barton : 1
Blake Sigmundstad: 8
Diego Moylan: 4
Dillon Shaffer: 4
Ismoiljon Muzaffarov: 7
Jacob Tanner: 6
Josh Stoneback: 2
Joshua Bowen: 3
Joshua Culwell: 5
Laura Banaszewski: 4
Lina Hammel: 1
Logan Racz: 1
Matt Hall: 2
Micah Miller: 8
Mike Kadoshnikov: 3
Owen Cool: 2
Racquel Bowen: 3
Samuel Mocabee: 6
Tatiana Kirillova: 7

Group exercises - Problem Set 9

1. (6.2.3) Show that a state i is recurrent if and only if the mean number of visits of the chain to i, having started at i, is infinite.
2. (6.4.6) **Random walk on a graph.** A particle performs a random walk on a vertex set of a connected graph G, which for simplicity we assume to have neither loops nor multiple edges. At each stage it moves to a neighbor of its current position, each such neighbor being chosen with equal probability. If G has $\eta(< \infty)$ edges, show that the stationary distribution is given by $\pi_v = d_v/(2\eta)$, where d is the degree of vertex v.
3. (6.4.11a) **Bow tie.** A particle performs a random walk on a bow tie ABCDE drawn beneath, where C is the knot. From any vertex its next step is equally likely to be any neighboring vertex. Initially it is at A. Find the expected value of the time of first return to A.