

Math 339SP, Fall 2025 — Homework 6

Tim Chumley

Due October 16 at 5:00 pm

Instructions. This problem set contains problems mostly from Week 6 of class. The problem numbers refer to our textbook, *Introduction to Stochastic Processes with R* by Robert P. Dobrow.

Problem 1. Please do the following textbook problems: 3.50bc, 3.51, 3.52, 3.54, 3.59, 4.1.

Remark 1. In preparation for a few of these exercises, read the subsection Expected Hitting Times for Irreducible Chains in Section 3.8 up through Example 3.30. The lesson here is that it is sometimes helpful to modify a given non-absorbing chain into an absorbing chain in order to study questions related to first hitting times.

Remark 2. In a few of these exercises, it will be helpful to recall that for a finite state, irreducible Markov chain, the stationary distribution value for state i is the inverse of the expected return time to state i .

Remark 3. In preparation for Exercise 3.52, read the introduction to Section 3.8 for an overview of the Chutes and Ladders game. Note that if the player lands on square 2, they immediately move to square 7 and the next state of the Markov chain is 7, not 2. Similar rules apply to states 5 and 8. Also note that the finishing square, square 9, must be reached by an exact roll of the die, and the player stays in their current square if the die roll is higher than the exact number of steps needed.