

IEOR 6711: Stochastic Models I

Homework Assignment 10, Tuesday, November 5

Chapter 4: More Markov Chains, Due on Tuesday, November 12.

MATLAB numerical Problems. Use the MATLAB programs posted online (on the “Computational Tools” page), or programs of your own creation, to solve the ergodic and absorbing Markov-mouse problems discussed in class (with model data also posted online) to answer the following questions:

1. The Closed Maze (Ergodic Case)
 - (a) What is the long-run proportion of time (steps) that the mouse spends in Room 5?
 - (b) Is there a unique stationary probability vector? If so, what is the stationary probability that the mouse spends in Room 5?
 - (c) What is the limit (as $n \rightarrow \infty$) of the probability that the mouse is in Room 5 at step n , given that the mouse starts in Room 1?
 - (d) What is the expected number of transitions between successive visits to Room 5?
2. The Escaping Mouse (Absorbing Case)
 - (a) What is the expected number of steps (transitions) until the mouse leaves the maze, starting in Room 1?
 - (b) What is the expected number of times (steps) that the mouse spends in Room 5 before leaving the maze, given that the mouse starts in Room 1?
 - (c) What is the probability that the mouse eventually leaves the maze through the door out of Room 3, given that the mouse starts in Room 1?

In addition to answering the questions above, showing your work, please turn in computer output.

Problems from Chapter 4 of *Stochastic Processes*, second edition, by Sheldon Ross. You only need turn in the ones without answers in the back.

Problem 4.16 (Answer in back)

Problem 4.17 (Answer in back)

Problem 4.18

Problem 4.19

Problem 4.20 (Answer in back)

Problem 4.21 (Answer in back)

Problem 4.30 (Answer in back)

Problem 4.31