

Math 5040, Assignment 3. Due Wed. Nov. 4.

Problem 0. *Some Markov chains* A fair die is rolled repeatedly. Determine which of the following are Markov chains, and for those that are, *provide their state spaces and one-step transition matrices*. Here $n = 0, 1, 2, \dots$

- (a) The largest number M_n in the first n rolls.
- (b) The number N_n of sixes in the first n rolls.
- (c) After the n th roll, the (nonnegative) number A_n of rolls since the last six (with $A_n := n$ if no sixes have appeared).
- (d) After the n th roll, the (positive) number B_n of rolls until the next six.
- (e) $C_n := A_n + B_n$.

Problems 1–5. From the text, Chapter 2. 1, 2, 4, 8, 10.

Problem 6. Approximate the result of Problem 2.8(a) in the text using simulation. Try to get within 0.001 with probability 0.95.