Due: Monday, October 25th (11:59 p.m. PT.)

References are to the course textbook (Ross, 12th edition), except as noted.

Reading

For Wednesday, October 13th, Sections 4.1 and 4.2.

For Friday, October 15th, Section 4.3.

For Monday, October 18th, Section 4.4.

For Wednesday, October 20th, Section 4.5.

For Friday, October 22nd, Section 4.6.

For Monday, October 25th, Section 4.7.

Assignment exercises to hand in

Take the digits of your student id, in order: a_1, a_2, a_3, a_4, a_5, a_6, a_7, a_8 and a_9. Your *personal Markov Chain* tracks your mood from hour to hour. Your mood has three states: Happy (state 0), Sad (state 1) and Asleep (state 2). You personal transition matrix is given by:

$$\begin{pmatrix} \frac{a_1}{a_1+a_2+a_3} & \frac{a_2}{a_1+a_2+a_3} & \frac{a_3}{a_1+a_2+a_3} \\ \frac{a_4}{a_4+a_5+a_6} & \frac{a_5}{a_4+a_5+a_6} & \frac{a_6}{a_4+a_5+a_6} \\ \frac{a_7}{a_7+a_8+a_9} & \frac{a_8}{a_7+a_8+a_9} & \frac{a_9}{a_7+a_8+a_9} \end{pmatrix}$$

1. Verify that this a transition probability matrix.
2. Suppose that you are happy at a given moment. What are the probabilities that you are happy, sad and asleep, respectively, three hours later?
3. In the long run, what fraction of the time are you asleep?
4. Which of your states are recurrent, and which are transient?
5. Is your Markov chain reducible or irreducible?
6. Suppose that Lady MacBeth is not able to sleep. What do you expect is true of her student number?
7. Suppose that Rip Van Winkle sleeps for 20 years, at which point SFU retires his student number, releasing him from his personal Markov chain. What do you expect was true of his student number?
8. Chapter 4, Exercise 2
9. Chapter 4, Exercise 3
10. Chapter 4, Exercise 5
11. Chapter 4, Exercise 14
12. Chapter 4, Exercise 20
13. Chapter 4, Exercise 22
14. Chapter 4, Exercise 28