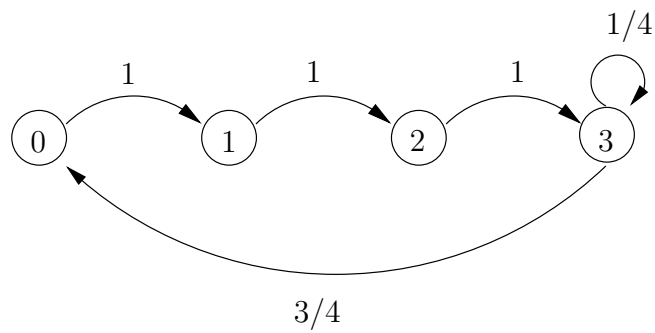


Stochastic Processes, HW3

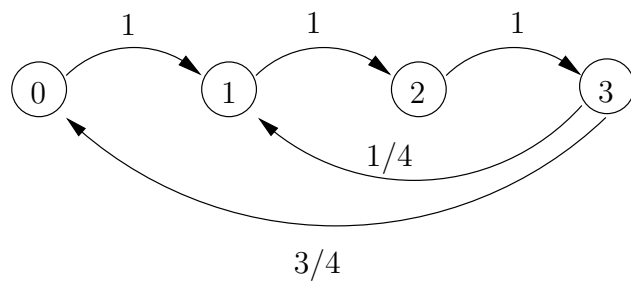
1. Book p.518–519: 10, 14, 15.

2. Find the period of the state 0 in the following Markov chains:

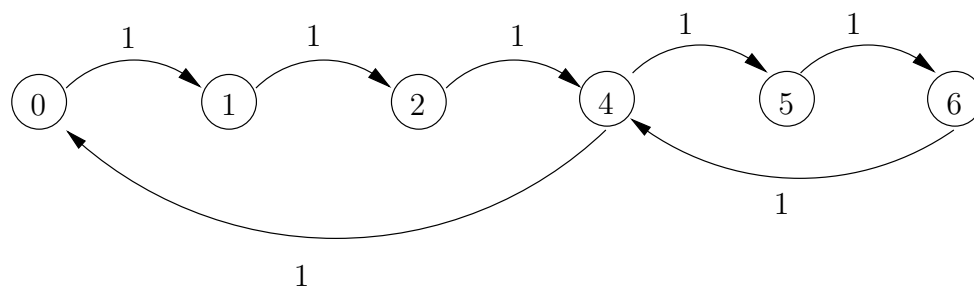
(a)



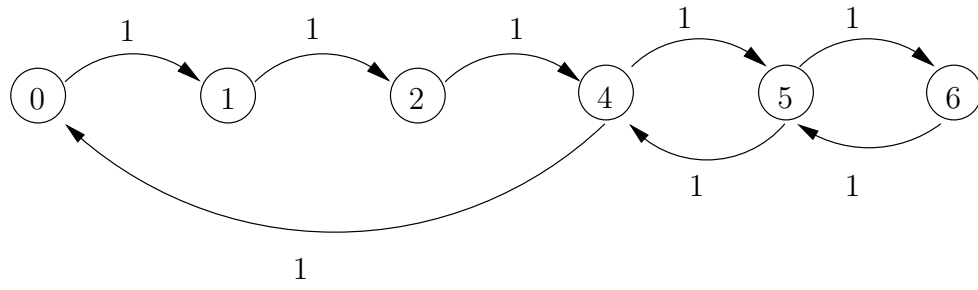
(b)



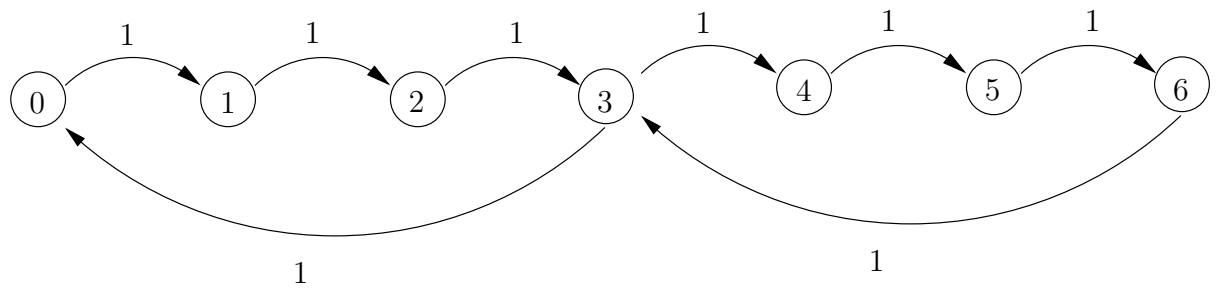
(c)



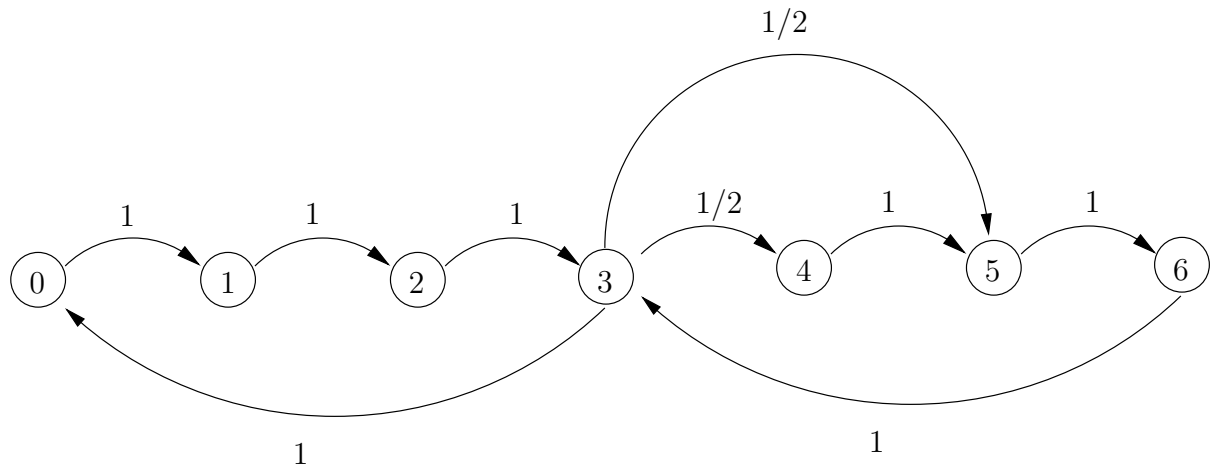
(d)



(e)



(f)



Turn-in problems

1. Consider the queueing example we did in class with $p = 0.49$. If there are currently five customers in the system, what is **(a)** the expected time (number of changes) until there are again five customers and **(b)** the expected number of times the system is empty until it is back to five customers?
2. Let $\{X_n, n = 0, 1, \dots\}$ be a Markov chain with transition matrix P and define $Y_n = X_{2n}$.
 - (a)** The sequence $\{Y_n, n = 0, 1, \dots\}$ is also a Markov chain. What is its transition matrix?
 - (b)** If $\{X_n\}$ is irreducible, must $\{Y_n\}$ be irreducible? Give proof or counterexample.
 - (c)** If $\{Y_n\}$ is irreducible, must $\{X_n\}$ be irreducible? Give proof or counterexample.
3. Book p.519, Problem 12. Note: the answer in the back of the book tells you that $p_{32} = 3/5$ and $p_{34} = 2/5$. Argue why this is the case, by computing probabilities or arguing intuitively.
4. Book, p.520, Problem 16.