SI252 Reinforcement Learning 2020/04/12

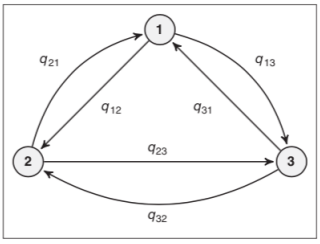
Homework 3

Professor: Ziyu Shao *Due: 2020/04/30 11:59am*

1. Nine problems from Harvard Textbook BH (the first edition): Chapter 11, Problems 2, 4, 6, 7, 8, 14, 16, 17, 18, 19

2. Show that holding time of states in continuous-time Markov chain(CTMC) are Exponentially Distributed (Hint: Memoryless Property).

3. Given a three-state CTMC with transition rates between states shown in the following diagram:



   Find holding time for each state, transition probability matrix of embedded chain, and the generator matrix.

4. **Three Server Organizations**: in the following figure, we show three data center systems with the same arriving rate λ and the same total service rate $k\mu$: FDM, M/M/1 and M/M/k. Please discuss the pros and cons of each system. Regarding the performance of average delay, which system is the best? Show your analysis (CTMC & Queueing Theory) and simulation results.