Math 154, Spring 2021 HOMEWORK #4 due Thursday, May 6

Q1. (8pts) Prove that a k-regular bipartite graph on $n \geq 2$ vertices ($k \geq 1$) has the following property: its edge set E can be written as the union of k edge-disjoint perfect matchings.

Q2. (8pts) Solve Question 5.2 from the textbook, using the ideas of the Hopcroft-Karp algorithm (at every step, find an M-augmenting path).

Q3. (8pts) Solve Question 5.4 from the textbook. Note: you may find the proof of Corollary 2 from Lecture 12 matches well here.

Q4. (6pts) Solve Question 5.15 part a) only. Note: what would happen if it had at least 2?