CSCI 570 - Summer 2021 - HW 1
Due 2:59 PM, July 6th
Late submissions won't be graded.

1 Graded Problems

1. State True/False: An instance of the stable marriage problem has a unique stable matching if and only if the version of the Gale-Shapely algorithm where the male proposes and the version where the female proposes both yield the exact same matching.

2. State True/False: For a search starting at node s in graph G, the DFS Tree is never the same as the BFS tree.

3. State True/False: Any DAG has a topological ordering.

4. A stable roommate problem with 4 students a, b, c, d is defined as follows. Each student ranks the other three in strict order of preference. A matching is defined as the separation of the students into two disjoint pairs. A matching is stable if no two separated students prefer each other to their current roommates. Does a stable matching always exist? If yes, give a proof. Otherwise give an example roommate preference where no stable matching exists.

5. Solve Kleinberg and Tardos, **Chapter 2, Exercise 4**.

6. Solve Kleinberg and Tardos, **Chapter 3, Exercise 2**.

2 Practice Problems

1. Solve Kleinberg and Tardos, **Chapter 1, Exercise 4**.

2. Solve Kleinberg and Tardos, **Chapter 2, Exercise 3**

3. Solve Kleinberg and Tardos, **Chapter 2, Exercise 5**

4. Solve Kleinberg and Tardos, **Chapter 3, Exercise 6**