

## Homework 6, Due day: April 27

All solutions should be typed, using Latex preferably (suggested to use Overleaf software).

(1) Chapter 11, 2

(2) Chapter 11, 4

(3) Chapter 11, 10

(4) For a given graph with 7 nodes (A, B, C, D, E, F, G) and 14 links (A, B), (A, G), (A, F), (B, C), (B, D), (B, G), (B, F), (C, D), (C, F), (C, G), (D, E), (D, F), (E, F), and (F, G).

a. Find the global minimum cut (no need to apply any optimal algorithm).

b. Run the contraction algorithm 100 times. Find out the percentage of time the algorithm finds the global minimum cut. Show both your code and the result.

(5) Adversary supplement one: 5.4

(6) In Stan Smith group of 2015 ATP world tour finals, there are four players Federer (F), Djokovic (D), Berdych (B), and Nishikori (N). In the round-robin meetings, suppose Federer beats Berdych (denoted as  $F \rightarrow B$ ),  $D \rightarrow N$ ,  $N \rightarrow B$ ,  $F \rightarrow D$ ,  $N \rightarrow F$  (\*), and  $D \rightarrow B$ . (\*: the actual result was the opposite.)

a. Find all the kings in the group tournament.

b. Find all the sorted sequence of kings in the group tournament.

c. Prove that for any round-robin tournament, there is at least one king and one sorted sequence of kings.