

<p>Name: Harshit Jain Access ID: hmj5262 Recitation: 8</p>

Problem 0

Points:

Acknowledgements

- (a) I did not work in a group.
- (b) I did not consult without anyone my group members.
- (c) I did not consult any non-class materials.

Problem 1

Points:

The minimum cut of a weighted graph is defined as the minimum sum of weights of edges that, when removed from the graph, divide the graph into two sets.

Algorithm 1: UniqueMinimumCut

```
Input :  $G = (V, (E, \ell_e))$ 
Output: A unique cut is present or not
1  $C = \text{STCut}(G)$ 
2  $|C| = \text{CapacityOfCut}(C)$ 
3 for  $e_i \in C$  do
4    $\text{capacity}(e_i) += 1$ 
5    $|C_i| = \text{STCut}(C)$ 
6   if  $|C| == |C_i|$  and  $C \neq C_i$  then
7     return "Min-cut is not unique"
8   end if
9   if  $|C| < |C_i|$  then
10    continue
11  end if
12 end for
13 return "Min-cut is unique"
```

In conclusion, the graph has a unique minimum cut iff $|C| < |C_i| \forall i$. The algorithm takes at most $m + 1$ computing of minimum cuts, and therefore runs in polynomial time.

Problem 2

Points:

Problem 3

Points:
