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Problem 1 | **Points:**

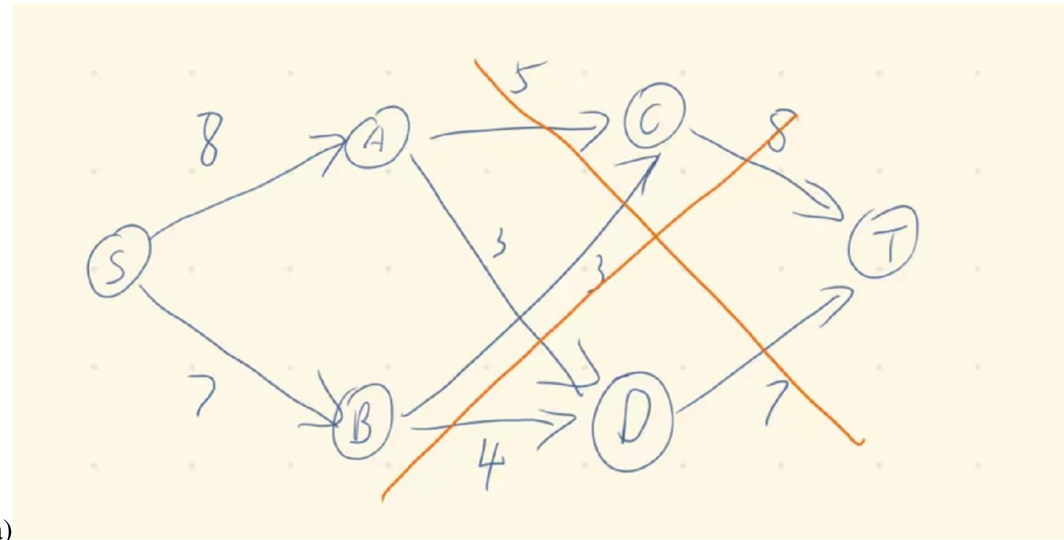
I did not work in a group.

“I did not consult anyone except my group members”.

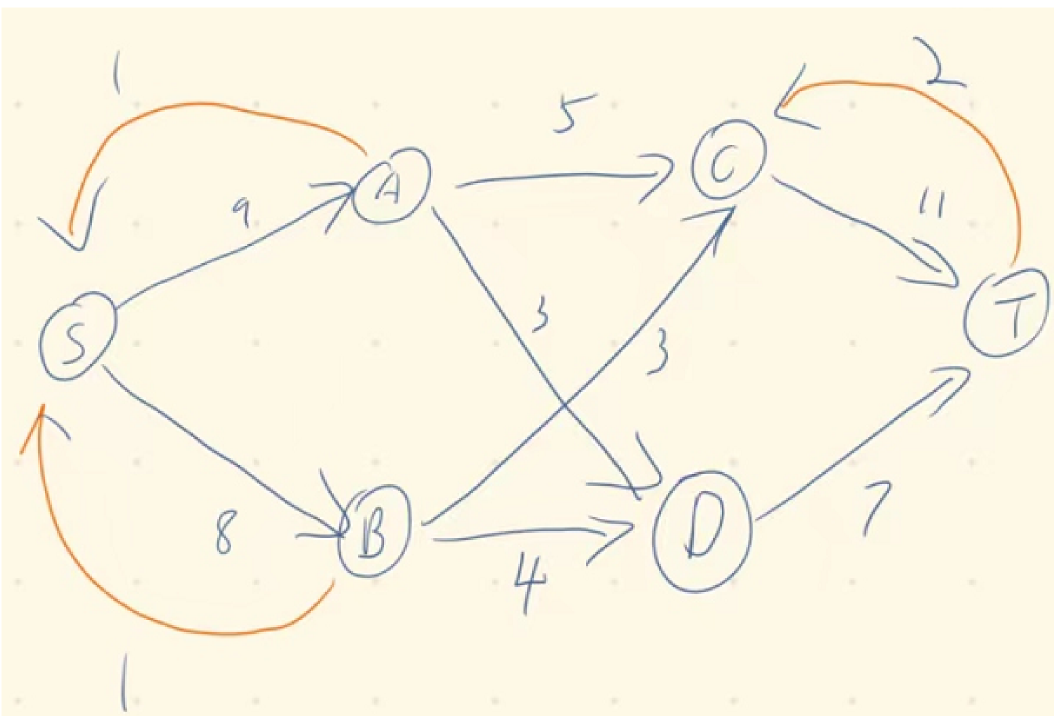
NO non-class material.

Problem 2

Points:

a) 

Max flow will be 15 and min cut is the two orange cut on graph.

b) 

$B \Rightarrow S(1)$

$A \Rightarrow S(1)$

$T \Rightarrow C(2)$

c) critical edge

$A \Rightarrow D$

$A \Rightarrow C$

$B \Rightarrow C$

$B \Rightarrow D$

$D \Rightarrow T$

Problem 3

Points:

since one of the edge's capacity is reduced to 1, and all other edges has not been changed, we can increase the maximum flow by 1, and it will not affect the flow, but the max flow will not be able to balance between both side of edge e, and we will need the residual graph.

In the residual graph, a path will be build from t to v and u to s, then, we can lower the flow on all edges of two path from t to v and u to s, so the imbalance will be solved, and then we will be able to check if the flow will be appropriate by increase the edges one by one, before edge e is unavailable.

the complexity will be O(m+n).