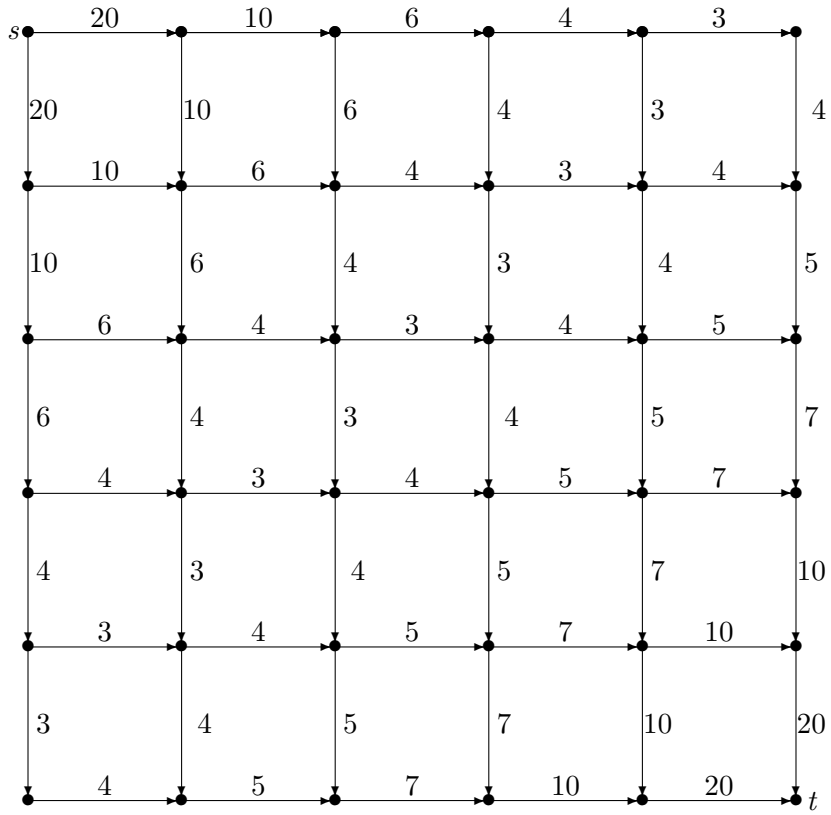
University of Washington
Department of Computer Science and Engineering
CSE 417, Winter 2020

March 13, 2020

Homework 9, Problem 5

Problem 5 (10 points):

Consider the following flow graph. Find a maximum flow.

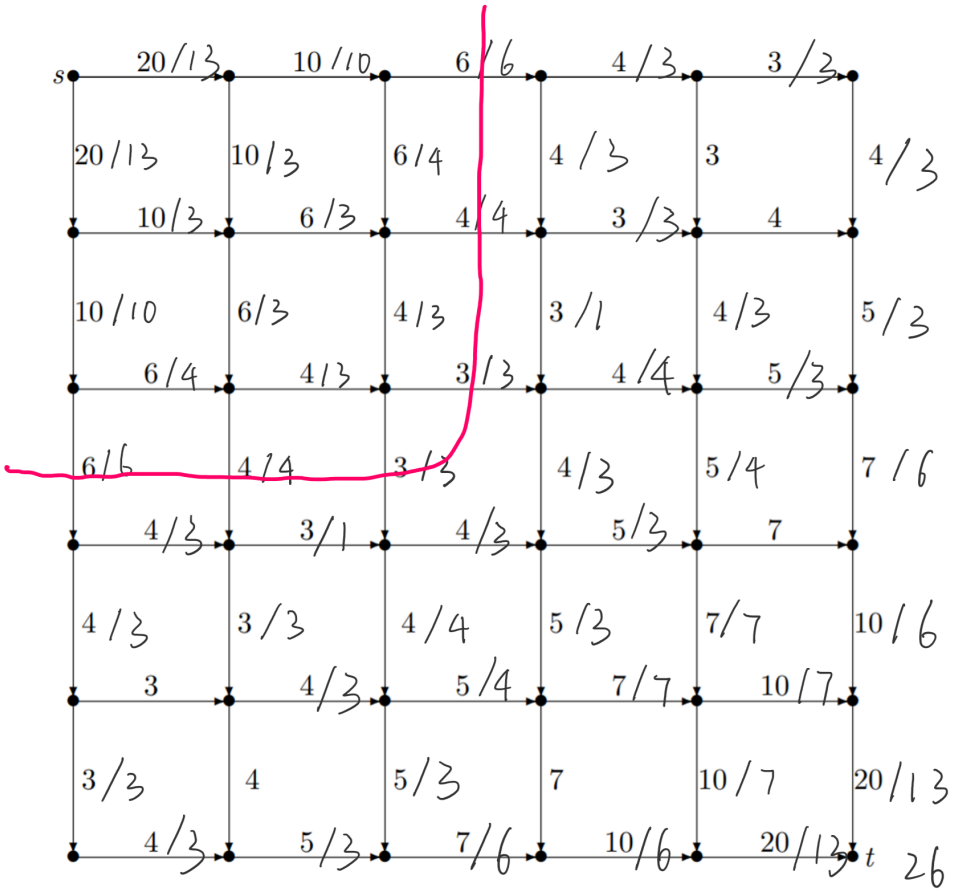


a) What is the value of the maximum flow? Indicate the value of flow on each edge.

b) Prove that your flow is maximum.

Answer:

a)



b) This must be maximum flow, because it solves by Ford-Fulkerson algorithm, and also because as labeled in the figure, the red line labeled the minimum cut. Since the flow and the cut have same value, the flow must be maximum flow and the cut must be minimum cut, because according to maximum flow-minimum cut theorem, maximum flow equals to minimum cut. Hence any cut that is not minimum cut must greater than any flow, and any flow smaller than maximum flow will smaller than any cut. According to the figure, the cut is equal to the flow value. Hence it must be maximum flow of the problem.