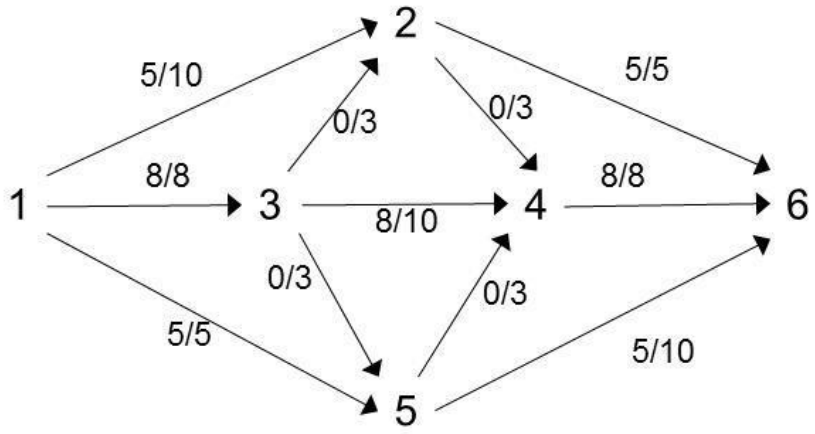
Lab: Finding Maximum Flow

Problem 1:



a) What is the value of the flow in the above network?

b) Use the algorithm discussed in class to find an augmenting path? Give the augmenting path by specifying the vertices from $1 \rightarrow \quad \ldots \quad \rightarrow 6$

c) Draw the flow network with the resulting flow. Value of the flow: _____

d) Apply the algorithm once more. What happens?

e) What is the maximum flow in the flow network?

f) What is the cut that shows that this is the maximum flow?

Problem 2

a) Explain how a maximum flow problem for a network with several sources and sinks can be transformed into an equivalent (will give an answer to the original problem) maximum flow problem with a single source and a single sink.

b) Suppose that in addition to the usual constraints a flow network has capacity constraints on the flow that can go through each intermediate vertex. Explain how a maximum flow problem for such a network can be transformed into an equivalent (will give an answer to the original problem) maximum flow problem.

Problem 3

Consider a flow network that is a rooted tree, with the root as its source, the leaves as its sinks, and all the edges directed in the direction of the paths from the root to the leaves. Design an efficient algorithm for finding a maximum flow in such a network. Give pseudo code for your algorithm. What is its efficiency and why?