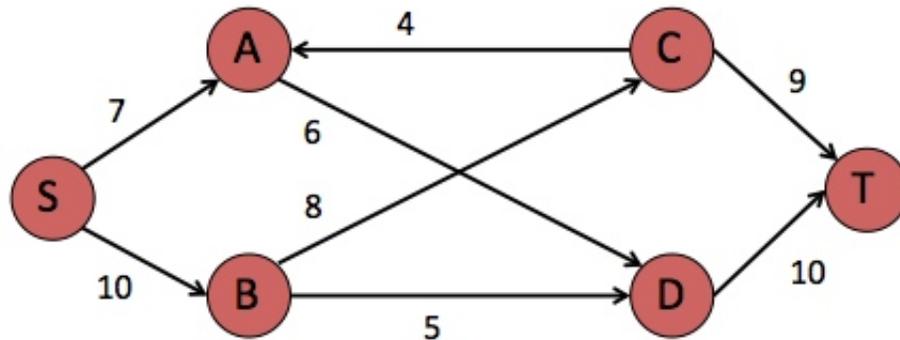


CS302 - Assignment 17

Due: Thursday, April 26 at the beginning of class
Hand-in method: paper

1. [13 points] Go with the flow



- (a) [2 points] Find the maximum flow f for the graph above and a minimum cut.
- (b) [2 points] Draw the residual graph G_F at this maximum flow.
- (c) [2 points] An edge of a network is called a *bottleneck edge* if increasing its capacity results in an increase in the maximum flow. List all of the bottleneck edges in the above network.
- (d) [2 points] Give a simple example (containing at most four nodes) of a valid flow network which has no bottleneck edges.
- (e) [5 points] Describe clearly (or write pseudocode for) an efficient algorithm to identify all the bottleneck edges in a network. *Hint:* It may be useful to calculate the max-flow first. State your running time.
2. [4 points] Suppose someone gives you a solution to a max-flow problem on some network (you can assume whatever form is convenient for how the solution is represented). Describe an efficient algorithm to determine whether the solution is indeed a maximum flow solution. State your running time.