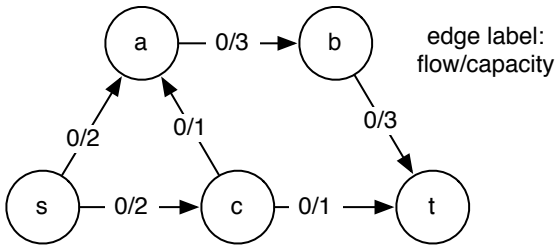
CS325 Assignment #4, Summer 2009, OSU

This assignment is due on Wednesday, 7/29/2009 at the beginning of class. For this assignment, you will be allowed to hand-draw your graphs if they are very neat.

Consider the flow network $G = (V, E)$, depicted below.



1. Run the Edmunds-Karp algorithm to find a max-flow. **For each iteration of the algorithm**, show the following (refer to the Ford-Fulkerson example linked on the course web page for an example of what these graphs should look like):
   (a) (4 points) The graph G, the current flow f, and the capacity for each edge c_e. Specifically, edges should be labeled with $f(e)/c_e$, i.e. flow / capacity.
   (b) (4 points) The residual graph with respect to the current flow, G_f.
   (c) (2 points) List the path from s to t in G_f that your are augmenting, and the bottleneck capacity in the path.
2. (1 point) What is the value of the flow $v(f)$? Recall that it is the total flow out of s.
3. (2 points) Run BFS in the final residual graph starting from s to find the min-capacity $s - t$ cut (S, T). Your answer should consist of a picture of the cut, and a list of which nodes are in S and T.
4. (1 point) What is the capacity of the cut? Recall the capacity of a cut is

$$C(S,T) = \sum_{x \in S, y \in T} c_{xy}$$

where c_{xy} is the capacity of edge (x, y), and the sum is taken over only edges going from a node in S to a node in T.

5. (2 point) You will be given between 0 and 2 points for the overall visual quality of your diagrams.