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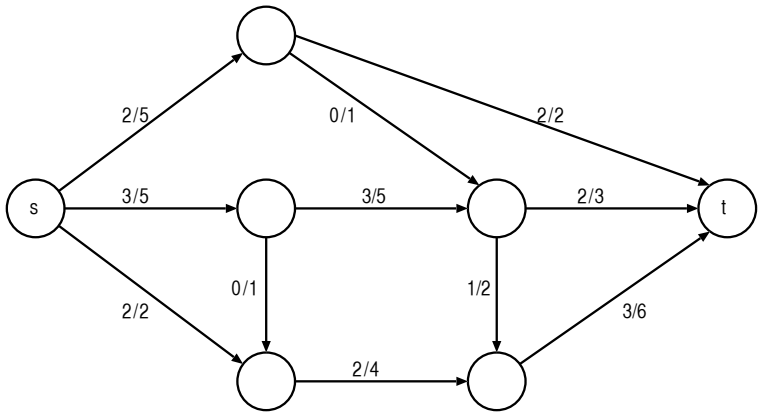
Algorithms

WS 2014/15

Exercises 3

1. **Ford-Fulkerson (Niveau I)**

   (a) Use the Ford-Fulkerson algorithm to find a maximum flow in the network

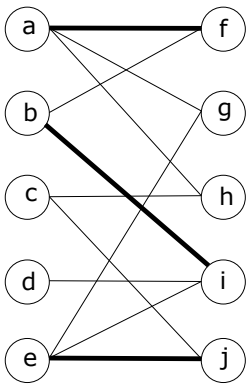


   Start with the initial flow f. An edge label f/c means initial flow f and capacity c.

   (b) Find a minimum cut proving the maximality of the flow.

2. **Matching and Bipartite Graphs (Niveau I)**

   (a) Apply the matching augmenting algorithm for bipartite graphs to the graph below and compute a maximum cardinality matching from the initial matching.



3. **Marriage Theorem (Niveau II)**

   Prove that a bipartite graph $G = (A \cup B, E)$, with $|A| = |B| = n$, has a perfect matching if and only if for all $B' \subseteq B, |B'| \leq |N(B')|$, where $N(B')$ is the set of all neighbors of nodes in B'.