

Prof. Dr. Alexander Bockmayr,
Prof. Dr. Knut Reinert,
Sandro Andreotti

January 19, 2010

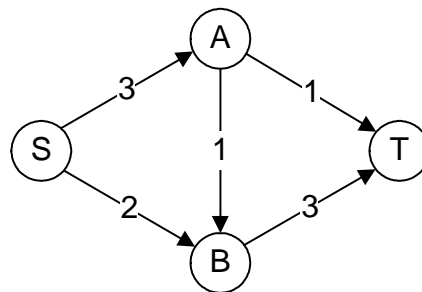
Discrete Mathematics for Bioinformatics (P1)

WS 2009/10

Exercises 11

1. Network Flows and Duality

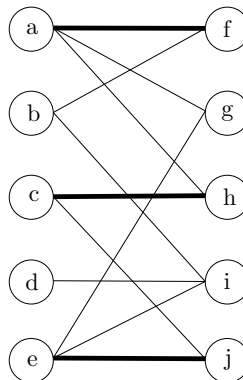
Consider the network shown in the figure below, and the corresponding max-flow problem:



- Model the problem as linear program (see script).
- Write down the dual problem (D) of the LP above. Give interpretations for the variables in the dual problem.

2. Matching and Bipartite Graphs

- Prove the proposition from the script:
A Graph $G = (V, E)$ is bipartite if and only if each circuit of G has even length.
- Apply the matching augmenting algorithm for bipartite graphs to the graph below and compute a maximum cardinality matching from the initial matching.
- Find a minimal vertex covering.



3. *Tree Decomposition*

How large is the largest piece of a any tree decomposition for a graph G of n nodes if G is a clique? Prove your answer.