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October 22, 2015

Algorithms

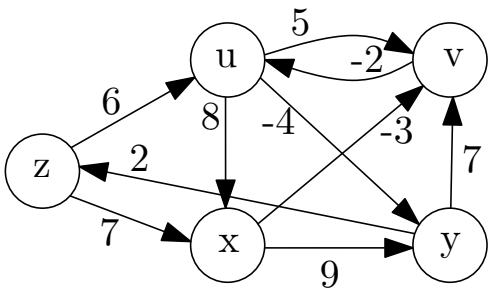
WS 2015/16

Exercise 2
(discussed on October 30th, 2015)

Prepare yourself to present your solutions to your fellow students.

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

   Use the Bellman-Ford algorithm (see lecture script) to determine the shortest path from source z to any other node in the graph.



2. **Bellman-Ford (Niveau II)**

   Let $D = (V, A), n = |V|$ be a directed graph. Prove that D contains a circuit of negative length reachable from s if and only if $f_n(v) \neq f_{n-1}(v)$, for some $v \in V$, where $f_k(v) = \min\{l(P) | P \text{ is an } s - v \text{ walk traversing at most } k \text{ arcs}\}$

3. **Longest Common Subsequence (Niveau I)**

   Compute the longest common subsequence (LCS) for the two sequences $a =$ `piece` and $b =$ `price` by first modelling this problem as a graph and then using Dijkstra's algorithm to compute the shortest path.

4. **Network Flow (Niveau I)**

   Assume a flow network with edge and additional vertex capacities. Each vertex v has a limit on the flow that can pass through it. Explain how to transform this flow network into an equivalent flow network without vertex capacities.