

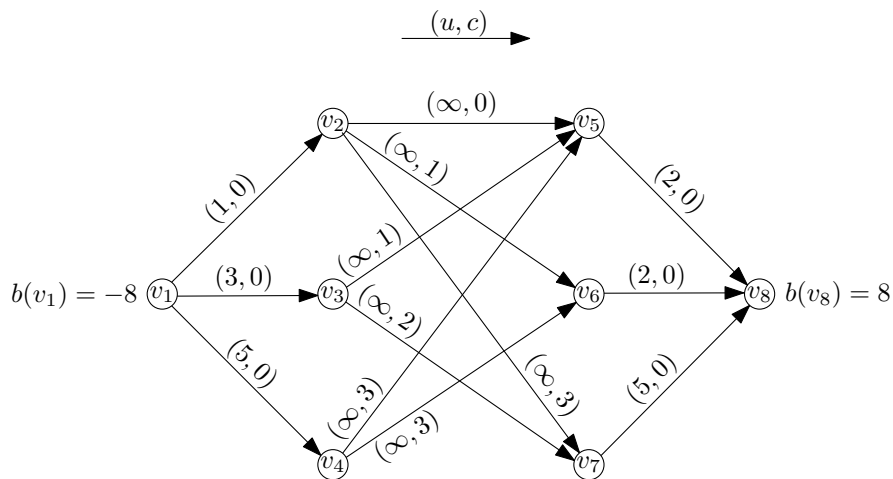
Assignment 7

Post Date: 6 June 2014 **Due Date:** 13 June 2014 **Tutorial:** 18 June 2014
 You are permitted and encouraged to work in groups of two.

Problem 1: Successive Shortest-Paths I

8 Points

Apply the Successive Shortest-Path algorithm to to Min-Cost Flow problem below.



Problem 2: Successive Shortest-Paths II

7 Points

Prove the following Lemma: If the Successive Shortest-Path algorithm returns “no feasible flow” then there is no feasible flow.

(Hint: Find an s - t -cut in the equivalent min-cost max-flow network that shows that a maximum flow can not saturate all edges leaving s .)

Problem 3: Residual Graph

5 Points

Show that a flow f is a min-cost flow if and only if there is no directed circle with negative costs in the residual graph. Use the *Reduced Cost Optimality Criterion* from the lecture notes in your proof!

(Hint: If there is no such circle, the shortest path distances in the network are well defined.)