Homework Assignment 7

CS 430 Introduction to Algorithms
Spring Semester, 2016

Due: Wednesday, April 13

1. Modify Dijkstra's algorithm so that it works with negative edge weights, as long as there are no negative cycles. Vertices that have come off the priority queue may have to be put back on.

2. The Floyd-Warshall all-pairs shortest path algorithm (section 25.2 of CLRS) computes, for each pair of vertices u, v, the shortest path from u to v. However, if the graph has negative cycles, the algorithm fails. Describe a modified version of the algorithm (with the same asymptotic time complexity) that correctly returns shortest-path distances, even if the graph contains negative cycles. That is, if there is a path from u to some negative cycle, and a path from that cycle to v, the algorithm should output $-\infty$ as the length of the shortest path from u to v. For other pairs of vertices the algorithm should correctly find the length of the shortest directed path.