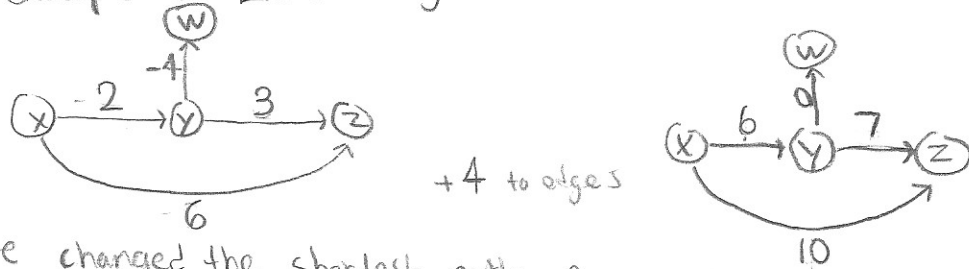


CSCI 3104: Algorithms HW 5

1. Finding shortest path with negative edges.

Counter example to Lake's algorithm



This procedure changed the shortest path from x to z of the original graph $x \rightarrow y \rightarrow z = -5 < -6$ to $x \rightarrow z = 10 < 13$ thus is not a valid method.

2. Decrease in driving distance between cities by adding new road.

To solve this problem we will use Dijkstra's algorithm as a means to find the shortest distance coming from each direction to a potential road $e' \in E'$ that will connect the two cities. This will provide shortest distances $D_s(x)$ (s to x) and $D_t(y)$ (t to y), that will be used in iteration of all $e' = (x, y) \in E'$ to find the edge or "road" that minimizes $D_s(x) + |e'| + D_t(y)$ for shortest route.

Running time would thus be Dijkstra $O((|V|+|E|)\log|V|)$ plus the iterations over the edges $O(|E'|)$ so total time $O((|V|+|E|)\log|V|+|E'|)$

Honor Code Pledge: X Jake Traut