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Algo homework 10

Problem 1:

Consider this Example:

figure a $a \xrightarrow{-3} b \xrightarrow{5} c$

figure b $a \xrightarrow{-3} b \xrightarrow{1} d \xrightarrow{3} c$

The shortest path would be figure(b) and the weight is 1. In order to use Dijkstra with negative edges, let us add 3 (since -3 is the smallest edge) compared to all other edges:

$$a \xrightarrow{0} b \xrightarrow{8} c$$

$$a \xrightarrow{0} b \xrightarrow{4} d \xrightarrow{6} c$$

Now the shortest path would be figure(a) which has a weight of 8. This happens since we add on a constant to each edge. Therefore the weight of the shortest path depends on how many edges we use. The real result can be done by subtracting the number of edges times the constant, but Dijkstra algorithm does not do that. Optimization for this to work can be done however the current problem statement does not state any optimization to be done