EE 360C - ALGORITHMS
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Name: **UT EID:**

Shortest Paths: For each of the following statements decide whether it is true of false. If it is true, give a short proof. If it is false give a counterexample.
Suppose we are given a directed graph $G = (V, E)$ and we assume all edge weights are positive and distinct. Let P be a shortest path from node s to node t with a weight of w_P.

a) Suppose the weight of each edge is increased by a constant, that is, the new edge weights are $w'_e = w_e + c$, for all $e \in E$, where c is some positive constant. True or false, P must still be the shortest path from node s to node t in the graph with the new weights?

b) Now, suppose the weight of each edge is doubled, that is, the new edge weights are $w'_e = 2w_e$, for all $e \in E$. True or false, P must still be the shortest path from node s to node t in the graph with the new weights?

c) Finally, suppose the weight of each edge is squared, that is, the new edge weights are $w'_e = w_e^2$, for all $e \in E$. True or false, P must still be the shortest path from node s to node t in the graph with the new weights?