Interview Questions: Shortest Paths

Warning: The hard deadline has passed. You can attempt it, but **you will not get credit for it**. You are welcome to try it as a learning exercise.

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Question 1

Montonic shortest path. Given an edge-weighted digraph G , design an $E \log E$ algorithm to find a *monotonic* shortest path from s to every other vertex. A path is *monotonic* if the sequence of edge weights along the path are either strictly increasing or strictly decreasing.

Question 2

Critical edge. Given an edge-weighted digraph, design an $E \log V$ algorithm to find an edge whose removal causes the maximal increase (possibly infinite) in the length of the shortest path from s to t . Assume all of the edge weights are strictly positive.

Question 3

Shortest path with one skippable edge. Given an edge-weighted digraph, design an $E \log V$ algorithm to find a shortest path from s to t where you can change the weight of any one edge to zero. Assume the edge weights are nonnegative.

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