

Problem 1 (10pts) Multiple choice

At least one option is correct, please fill in your answers in the table below.

| | |
|---|---|
| 1 | 2 |
| | |

(1) Which of the following statement is/are true?

- (A) Dijkstra's algorithm could work on negative-weighted graph.
- (B) Prim's algorithm could work on negative-weighted graph.
- (C) Bellman-Ford algorithm could work on negative-weighted graph.
- (D) Bellman-Ford algorithm could work on negative-cycled graph.

(2) Suppose you run Dijkstra's algorithm in graph G and get the correct shortest path P . Now you change the cost of all edges in G as follows and return the new shortest path P' . Which P' is guaranteed to be the same with P ? Assume $c(e) > 0$ for each e .

- (A) $c'(e) = c(e) + 17$.
- (B) $c'(e) = 17 \times c(e)$.
- (C) $c'(e) = \log_{17} c(e)$.
- (D) None of the above.

Problem 2 (10pts) Dijkstra's Algorithm Tiebreak

We are given a directed graph G with positive weights on **vertices** instead of edges, which means that when we visit a node, we need to cost its weight. We wish to find a shortest path from s to t . How would you modify Dijkstra's algorithm to this end? Just a description of your modification is needed.

Hint: you can just think about how to modify the graph instead of to modify Dijkstra's algorithm steps.