

(a) True. If we feed the costs  $c_e^2$  into Kruskal's algorithm, it will sort them in the same order, and hence put the same subset of edges in the MST.

*Note:* It is not enough just to say, "True, because the edge costs have the same order after they are sorted." The same sentence could be written about (b), which is false; it's crucial here to mention that there are minimum spanning tree algorithms that only care about the relative order of the costs, not their actual values.

(b) False. Let  $G$  have edges  $(s, v)$ ,  $(v, t)$ , and  $(s, t)$ , where the first two of these edges have cost 3 and the third has cost 5. Then the shortest path is the single edge  $(s, t)$ , but after squaring the costs the shortest path would go through  $v$ .

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<sup>1</sup>ex941.760.334