



# Reductions



1/3 points earned (33%)

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Review the material and try again! You have 3 attempts every 8 hours.

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0 / 1  
points

1.  
(seed = 594452)

Which of the following problems can be linear-time reduced \*to\* the standard shortest-paths problem in digraphs with nonnegative weights? Check all that apply.



Given a currency exchange digraph, determine if there exists an arbitrage opportunity.



This should not be selected



Given an undirected graph with arbitrary edge weights, find a negative cycle.



Un-selected is correct



Given a digraph with positive edge weights, find the shortest simple cycle.



Un-selected is correct



Given an undirected graph and two vertices  $s$  and  $t$ , among all paths between  $s$  and  $t$ , find one that uses the fewest edges.



Correct



Given a digraph and two vertices  $s$  and  $t$ , find a path from  $s$  to  $t$  that uses the fewest edges.



Correct



0 / 1  
points

2.

(seed = 558758)

Which problems are known to have the same asymptotic complexity as sorting an array of  $N$  real numbers? Assume the quadratic decision tree model of computation. Check all that apply.



Given an array of  $N$  real numbers, determine if any two sum to zero.



This should be selected



Given two arrays of  $N$  real numbers, is one a permutation of the other (i.e., they contain exactly the same multiset of numbers)?



Correct



Given an array of  $N$  real numbers, determine if any three sum to zero.



Un-selected is correct



Given an array of  $N$  real numbers, determine if any three are equal.



Correct



Given  $N$  points in the plane, compute a minimum spanning tree, where the weight between two points is its Euclidean distance.



Correct

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1 / 1  
points

3.  
(seed = 90120)

Suppose that problem A linear-time reduces to problem B. Which of the following can you infer? Check all that apply.



A cannot be solved in poly-time.



Un-selected is correct



B cannot be solved in poly-time.



Un-selected is correct



If A cannot be solved in poly-time, then neither can B.



Correct



If A cannot be solved in linear time, then B cannot be solved in poly-time.



Un-selected is correct



If A cannot be solved in quadratic time, then neither can B.



Correct

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