Reductions

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.

To specify an array or sequence of values in an answer, you must separate the values by a single space character (with no punctuation and with no leading or trailing whitespace). For example, if the question asks for the first ten powers of two (starting at 1), the only accepted answer is:

1 2 4 8 16 32 64 128 256 512

If you wish to discuss a particular question and answer in the forums, please post the entire question and answer, including the seed (which is used by the course staff to uniquely identify the question) and the explanation (which contains the correct answer).

In accordance with the Coursera Honor Code, I (Atul Gupta) certify that the answers here are my own work.

Question 1

(seed = 771656)

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

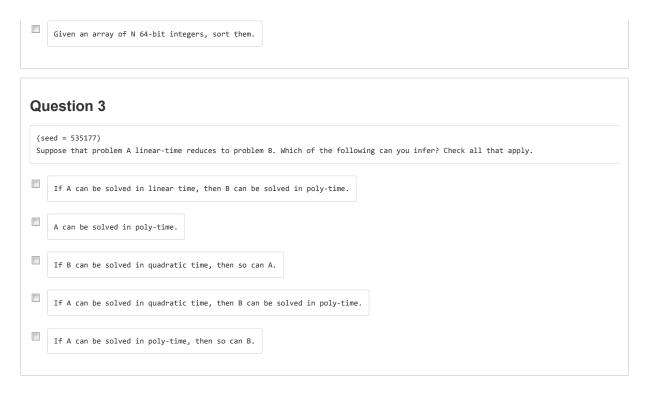
- Given a digraph with positve *vertex* weights and two vertices s and t, find a shortest path from s to t (where the length of t he path is the sum of the vertex weights).
- Given a digraph with positive edge weights and two vertices s and t, find the shortest path from s to t where you can change the e weight of any one edge to 0.
- Given a digraph with positive edge weights and two vertices s and t, find a shortest path from s to t that uses the fewest numb er of edges.
- Given a digraph with positive edge weights, find the shortest simple cycle.
- Given an undirected graph with arbitrary edge weights, find a negative cycle.

Question 2

(seed = 682713)

Which problems are known to have the same asymptotic complexity as sorting an array of N comparable elements? Check all that apply.

- Given an array of N comparable elements, find one that occurs most frequently.
- Given an array of N comparable elements, determine if any two are equal.
- Given an array of N numbers, determine if any three sum to zero.
- Given an array of N 64-bit integers, determine if any two are equal.



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You cannot submit your work until you agree to the Honor Code. Thanks!