Interview Questions: Directed Graphs

3/3 points earned (100%)

Excellent!

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1.
Shortest directed cycle. Given a digraph G, design an efficient algorithm to find a directed cycle with the minimum number of edges (or report that the graph is acyclic). The running time of your algorithm should be at most proportional to $V(E + V)$ and use space proportional to $E + V$, where V is the number of vertices and E is the number of edges.

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Thank you for your response.

Hint: run BFS from each vertex.

1 / 1 points

2.

Hamiltonian path in a DAG. Given a directed acyclic graph, design a linear-time algorithm to determine whether it has a *Hamiltonian path* (a simple path that visits every vertex), and if so, find one.

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Thank you for your response.

Hint: topological sort.

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1 / 1 points

3.

Reachable vertex.

- *DAG*: Design a linear-time algorithm to determine whether a DAG has a vertex that is reachable from every other vertex, and if so, find one.
- *Digraph*: Design a linear-time algorithm to determine whether a digraph has a vertex that is reachable from every other vertex, and if so, find one.

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Thank you for your response.

Hint (DAG): compute the outdegree of each vertex.

Hint (digraph): compute the strong components and look at the kernel DAG (the digraph that results when you contract each strong component to a single vertex).