Interview Questions: Directed Graphs

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.

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Question 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.

Question 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.

Question 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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