

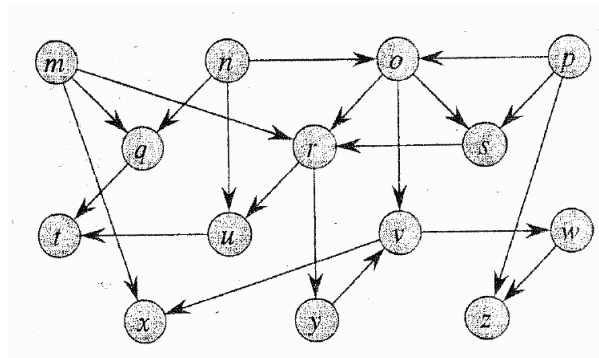
Design and Analysis of Algorithms

Problem #1.

A native Australian wishes to cross the desert carrying only one bottle of water. He has a map that shows all of the watering holes along the way. Assume that he can walk k miles on one bottle of water. Design an efficient technique or algorithm that he can use to determine where he should refill his bottle to make as few stops as possible. Explain why this algorithm works.

Problem #2.

Show the ordering of the vertices produced by a topological sort when it is run on the figure below, under the assumption that when there is a choice of vertices to consider, that the vertices are considered in *alphabetic order*.



Problem #3.

Use Dijkstra's single source shortest path algorithm for below questions.

- a. What type of algorithm is Dijkstra's algorithms (e.g., dynamic programming, divide and conquer, greedy, etc.?) Justify your answer by explaining why Dijkstra's algorithm satisfies the requirements to be this type of algorithm
- b. Show the shortest path from JFK to each of the other nodes on the below weighted graph.

