Congratulations! You passed!

TO PASS 1% or higher

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Interview Questions: Maximum Flow (ungraded)

TOTAL POINTS 3

1. **Fattest path.** Given an edge-weighted digraph and two vertices s and t, design an $E \log E$ algorithm to find a fattest path from s to t. The *bottleneck capacity* of a path is the minimum weight of an edge on the path. A *fattest path* is a path such that no other path has a higher bottleneck capacity. **1 / 1 point**

   Fattest Path

   Correct

   Hint: design a linear-time subroutine that takes a real-number T and determines if there is a path from s to t of bottleneck capacity greater than or equal to T.

2. **Perfect matchings in k-regular bipartite graphs.** Suppose that there are n men and n women at a dance and that each man knows exactly k women and each woman knows exactly k men (and relationships are mutual). Show that it is always possible to arrange a dance so that each man and woman are matched with someone they know. **1 / 1 point**

   Always possible to arrange a dance so that each man and woman are matched with someone they know.

   Correct

   Hint: formulate the bipartite matching problem as a maxflow problem; find a (fractional) feasible flow of value n; conclude that there is a perfect matching.

3. **Maximum weight closure problem.** A subset of vertices S in a digraph is *closed* if there are no edges pointing from S to a vertex outside S. Given a digraph with weights (positive or negative) on the *vertices*, find a closed subset of vertices of maximum total weight. **1 / 1 point**

   Find a closed subset of vertices of maximum total weight.

   Correct

   Hint: formulate as a mincut problem; assign edge (v, w) a weight of infinity if there is an edge from v to w in the original digraph.