1) 20 pts
For each of the following statements, answer whether it is TRUE or FALSE, and briefly justify your answer.

a) If a connected undirected graph G has the same weights for every edge, then every spanning tree of G is a minimum spanning tree, but such a spanning tree cannot be found in linear time.

T

b) Given a flow network G and a maximum flow of G that has already been computed, one can compute a minimum cut of G in linear time.

F

c) The Ford-Fulkerson Algorithm finds a maximum flow of a unit-capacity flow network with n vertices and m edges in time O(mn) if one uses depth-first search to find an augmenting path in each iteration.

T

d) Unless P = NP, 3-SAT has no polynomial-time algorithm.

F

e) The problem of deciding whether a given flow f of a given flow network G is a maximum flow can be solved in linear time.

F

f) If a decision problem A is polynomial-time reducible to a decision problem B (i.e., $A \leq_p B$), and B is NP-complete, then A must be NP-complete.

F

g) If a decision problem B is polynomial-time reducible to a decision problem A (i.e., $B \leq_p A$), and B is NP-complete, then A must be NP-complete.

T

h) Integer max flow (where flows and capacities are integers) is polynomial time reducible to linear programming .

F

i) It has been proved that NP-complete problems cannot be solved in polynomial time.

F

j) NP is a class of problems for which we do not have polynomial time solutions.

T