1) 20 pts
Mark the following statements as **TRUE** or **FALSE**. No need to provide any justification.

[TRUE /]
Given a minimum cut, we could find the maximum flow value in O(E) time.

[/ FALSE]
Any NP-hard problem can be solved in time O(2^poly(n)), where n is the input size and poly(n) is a polynomial.

[TRUE /]
Any NP problem can be solved in time O(2^poly(n)), where n is the input size and poly(n) is a polynomial.

[TRUE /]
If 3-SAT $\leq_p$ 2-SAT, then P = NP.

[/ FALSE]
Assuming P $\neq$ NP, there can exist a polynomial-time approximation algorithm for the general Traveling Salesman Problem.

[/ FALSE]
Let (S,V−S) be a minimum (s,t)-cut in the network flow graph G. Let (u,v) be an edge that crosses the cut in the forward direction, i.e., u $\in$ S and v $\in$ V−S. Then increasing the capacity of the edge (u, v) necessarily increases the maximum flow of G.

[/ FALSE]
If problem X can be solved using dynamic programming, then X belongs to P.

[/ FALSE]
All instances of linear programming have exactly one optimal solution.

[/ FALSE]
Let Y $\leq_p$ X and there exists a 2-approximation for X, then there must exist a 2-approximation for Y.

[TRUE /]
There is no known polynomial-time algorithm to solve an integer linear programming.