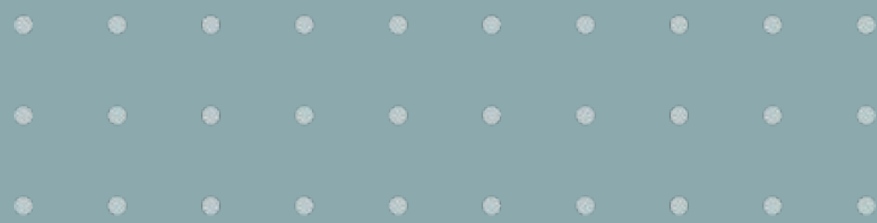# APPROXIMATION ALGORITHMS

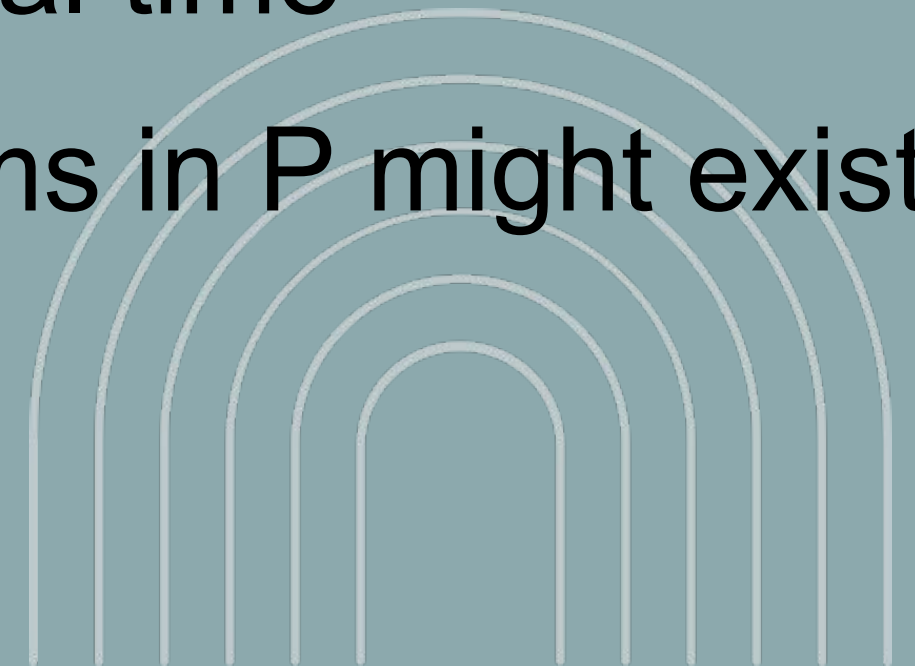*DSA Lab Project*

CLASSES OF PROBLEMS

P

Solvable and verifiable in polynomial time

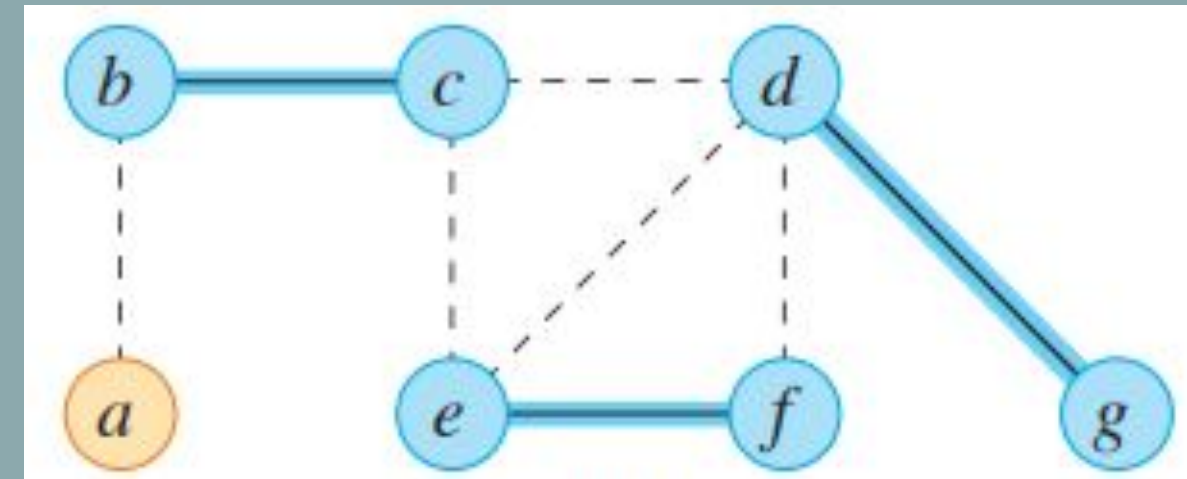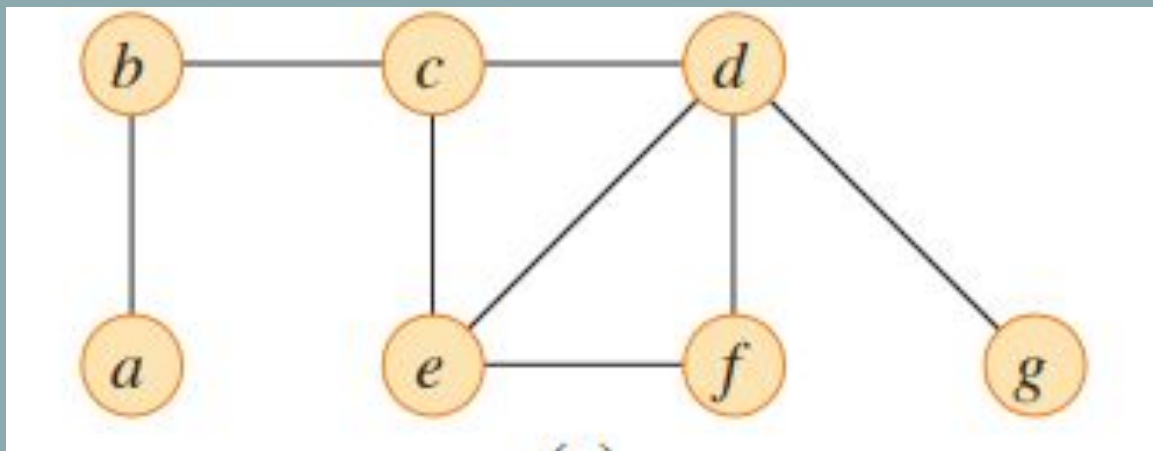**NP**

Verifiable in polynomial time
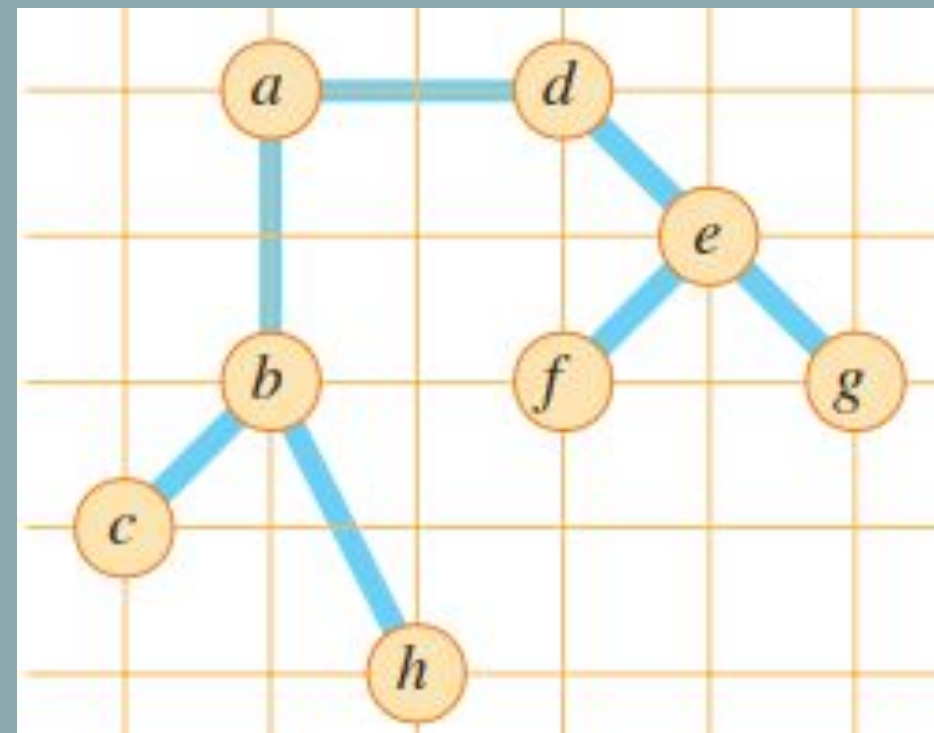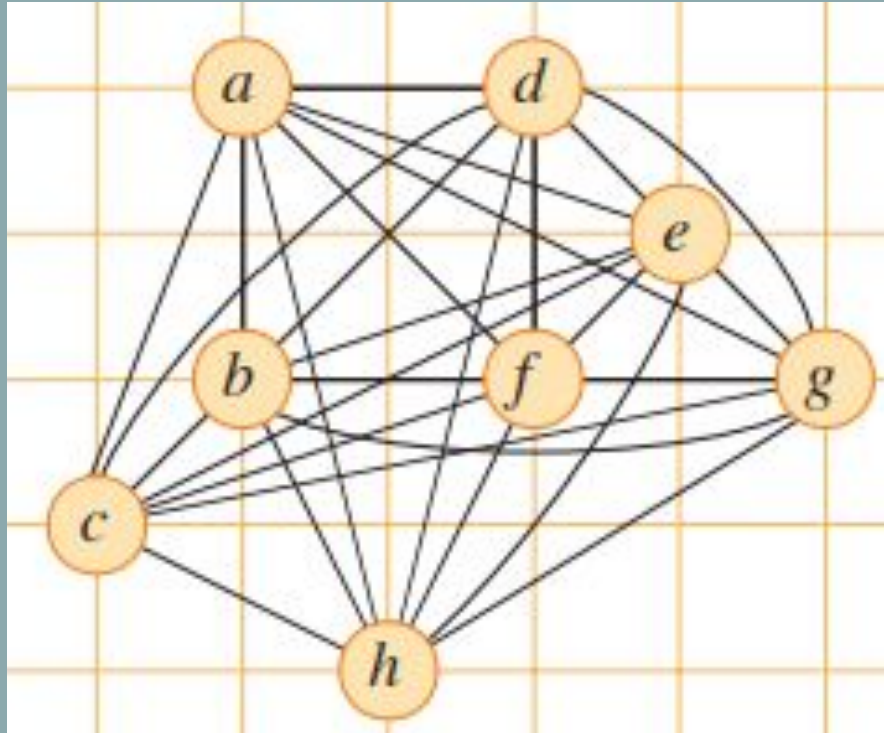
Potential approximation algorithms in P might exist

VERTEX COVER PROBLEM

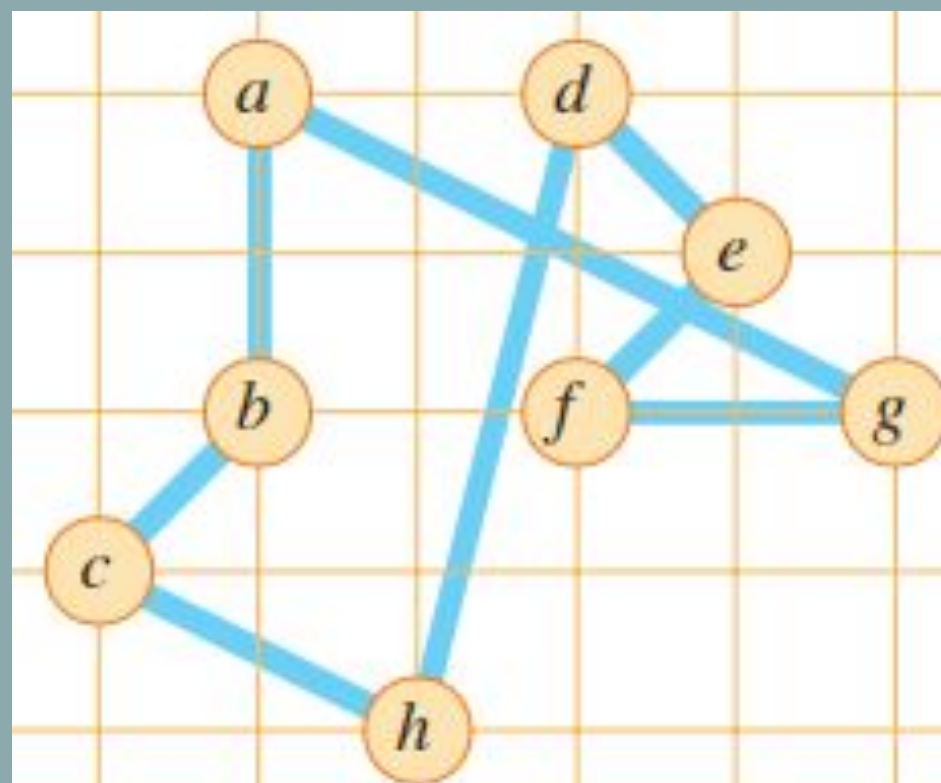$$|C^*| \geq |A|$$
$$|C| = 2|A|$$
$$\leq 2|C^*|$$

TRAVELLING SALESMAN PROBLEM

Pre-order walk- a, b, c, h, d, e, f, g

Full walk- a, b, c, b, h, b, a, d, e, f, e, g, e, d, a

APPROX-TSP-TOUR(G, c)

1   select a vertex $r \in G.V$ to be a "root" vertex
2   compute a minimum spanning tree T for G from root r
     using MST-PRIM(G, c, r)
3   let H be a list of vertices, ordered according to when they are first visited
     in a preorder tree walk of T
4   **return** the hamiltonian cycle H

FUTURE PLANS

- Subset sum & Knapsack problem
- Randomization & its application in game theory
- Probabilistic data structures like Bloom Filters & Skip lists
- Maximum Independent Set of Rectangles

THANK YOU!!