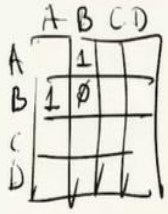
Graphs

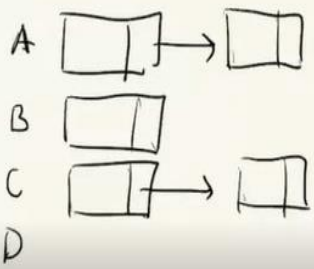
- Edge (Kenar)
- Vertex (Düğüm)

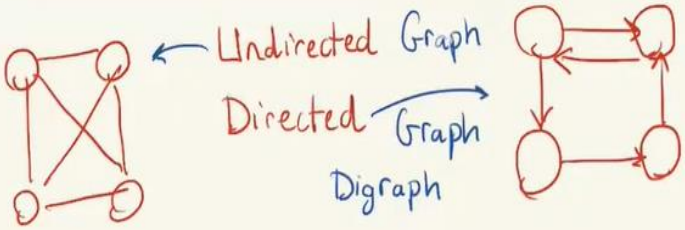
$G = \langle V, E \rangle$

Graph Representations

- Adjacency Matrix
- Adjacency List





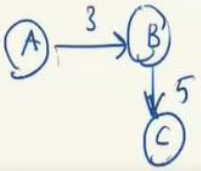


← Undirected Graph

Directed Graph

Digraph

Weighted Graph



17.05.2021

Week 11

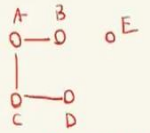
Traveling Sales Man Problem

- Prim's Algorithm } Finding MST
- Kruskal Algoritm

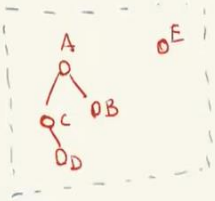
Graphs

- Connectivity
- Acyclic

Connected
Cyclic (Not Acyclic)



Not connected

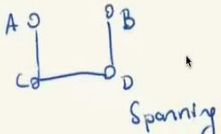


Forest

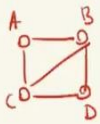
Acyclic

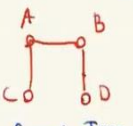
Spanning Tree

- Acyclic
- Connectivity



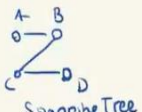
Spanning Tree



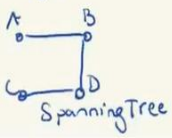


Spanning Tree

Minimum Spanning Tree

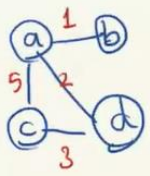


Spanning Tree

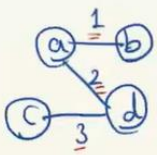


Spanning Tree

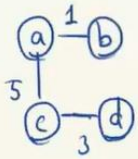
Minimum Spanning Tree Problem



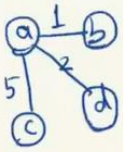
Graph



$w(T_1) = 6$



$w(T_2) = 9$



$w(T_3) = 8$

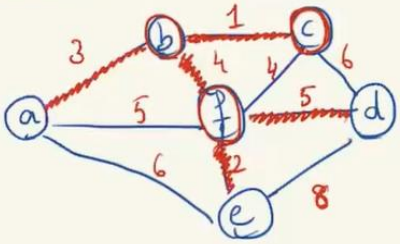
Minimum Spanning Tree

E:10 V:6

Kruskal Algorithm

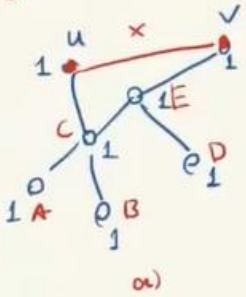
bc 1✓
ef 2✓
ab 3✓
bf 4✓
cf 4✗
af 5✗
df 5✓
ae 6 –
cd 6 –
de 8 –

(15)

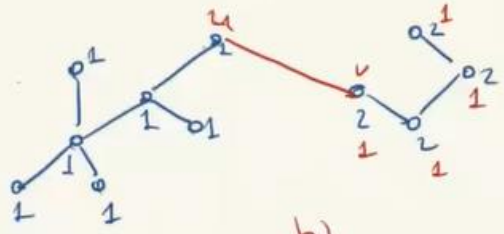


Kruskal Algorithm

Disjoint Subsets and Union-Find Algorithm

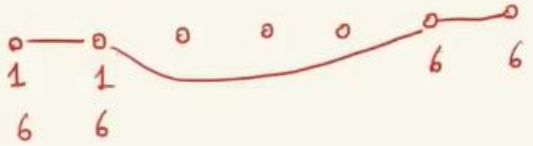


a)



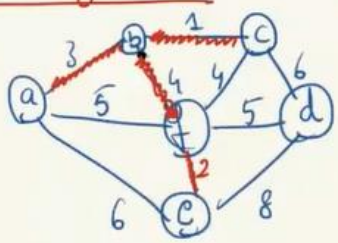
b)

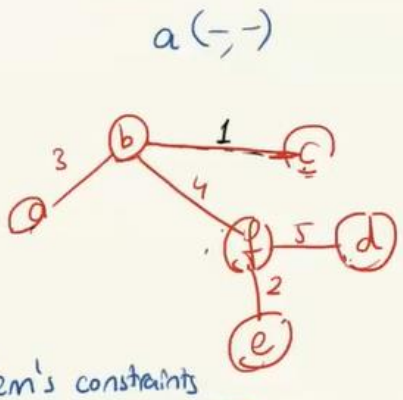
A	B	C	D	E	U	V
belongs	0	1	2	3	4	5	6



Time Complexity : $O(E \cdot \log V)$ Sparse Graphs

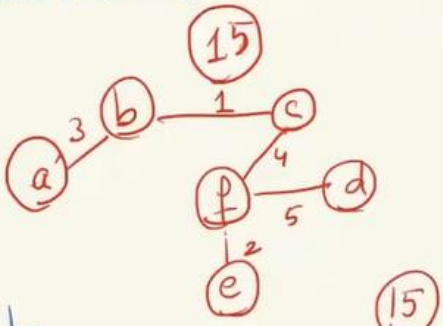
Prim's Algorithm





Greedy Technique

1. feasible → it has to satisfy the problem's constraints
2. locally optimal → it has to be the best local choice among all feasible choices available on that step.



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3. irrevocable → once made, it cannot be changed on subsequent steps of the algorithm.