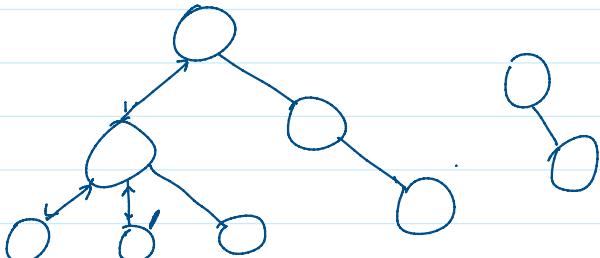


Tree

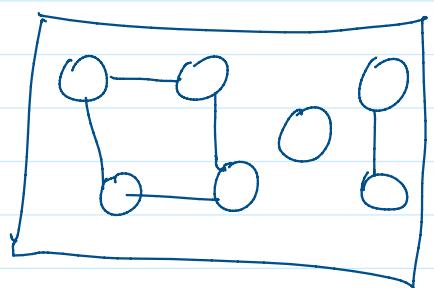
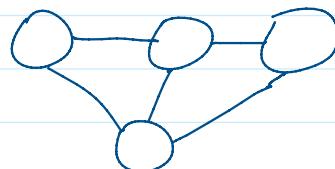
Graph?



Tree
→ not cyclic

??.

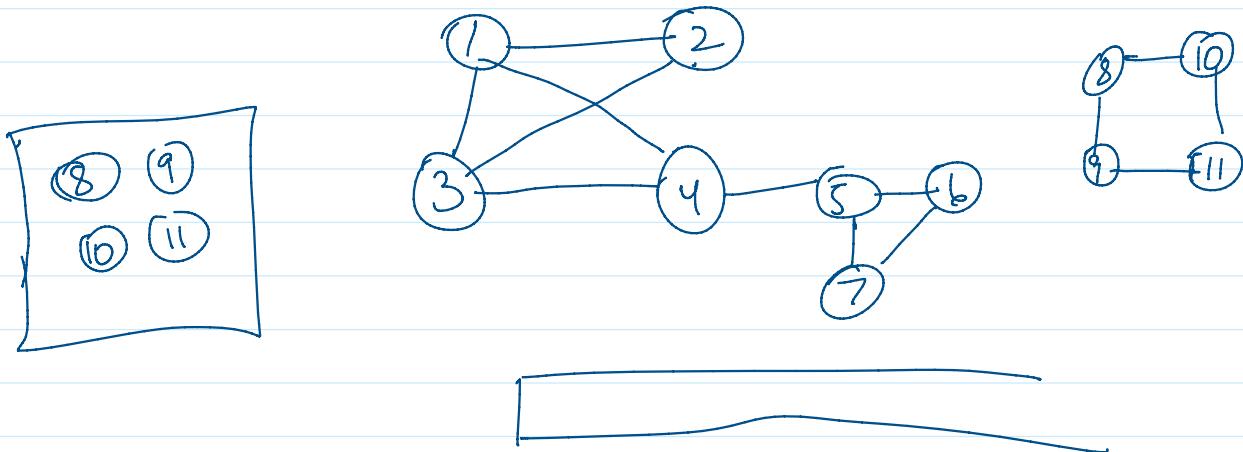
Graph
→ cyclic



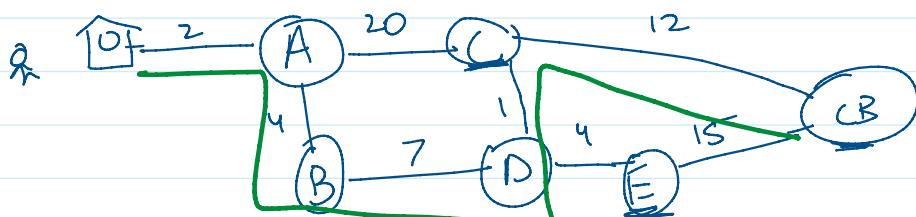
→ no. of components
①

Multiple

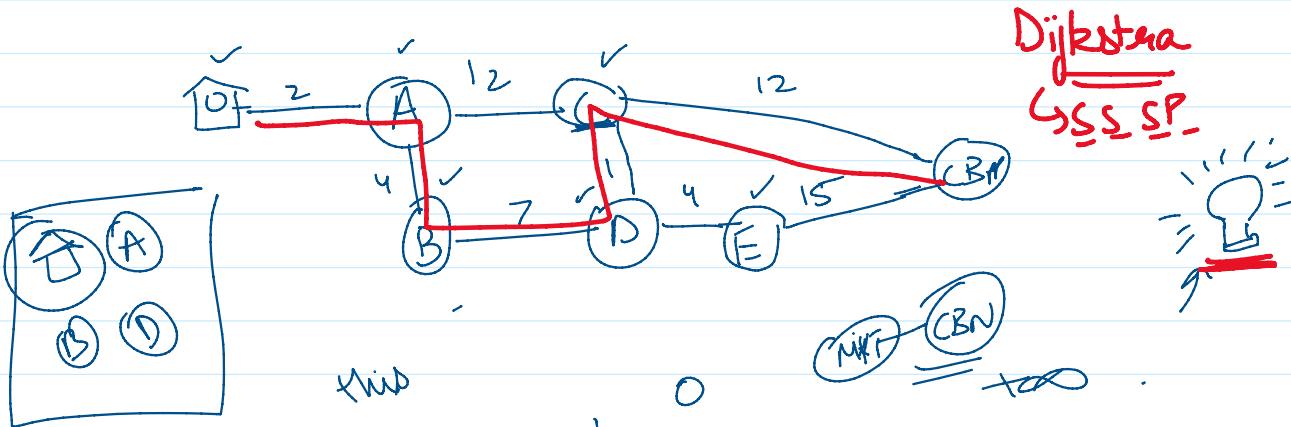
[1 => {2=10, 3=20, 4=6}, 2 => {1=10, 3=2}, 3 => {1=20, 2=2, 4=3}, 4 => {1=6, 3=3, 5=10}, 5 => {4=10, 6=9, 7=14}, 6 => {5=9, 7=3}, 7 => {5=14, 6=3}]



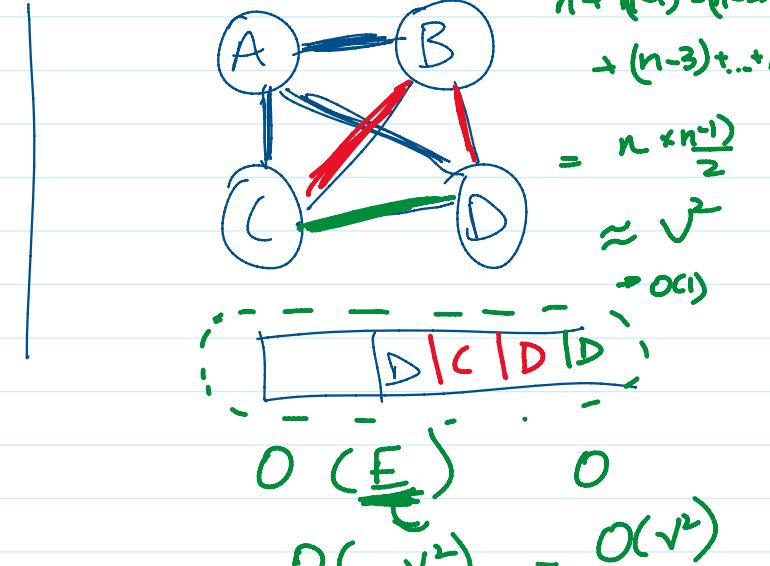
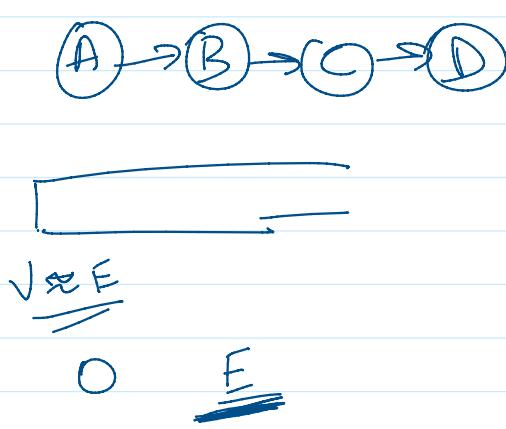
8:30



$\rightarrow A : 2$ $\rightarrow D : 13$
 $\rightarrow B : 6$ $\rightarrow E : 17$
 $\rightarrow C : 14$ $\Rightarrow CB : \underline{26}$

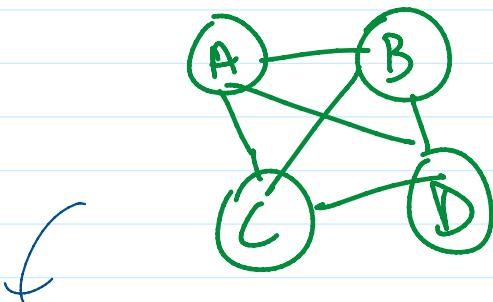


~~A > 100~~ | ~~B > 50~~ ~~A - B > 0~~
~~A - B > 0~~ ~~Compare To~~ \rightarrow ~~this - 0 / 0 - this~~
~~A - B > 0~~ ~~shifting~~
 $\underline{A - B < 0}$



$$U(E) \approx U(V)$$

$$O(\underline{v^2}) = \underline{O(v^2)}$$



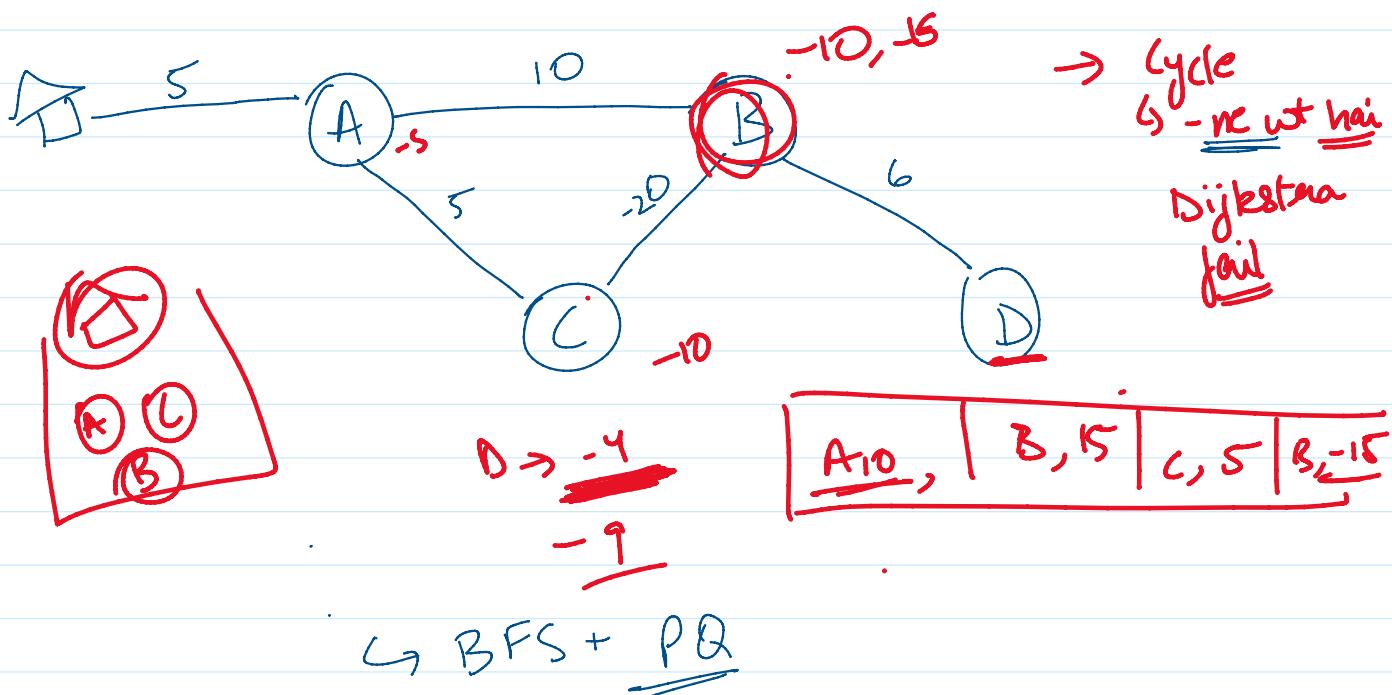
$$E \approx V$$

A:

B	C	D
---	---	---

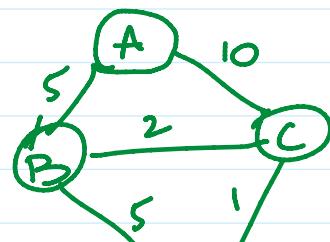
$\approx \sqrt{V}$
The max size of PQ

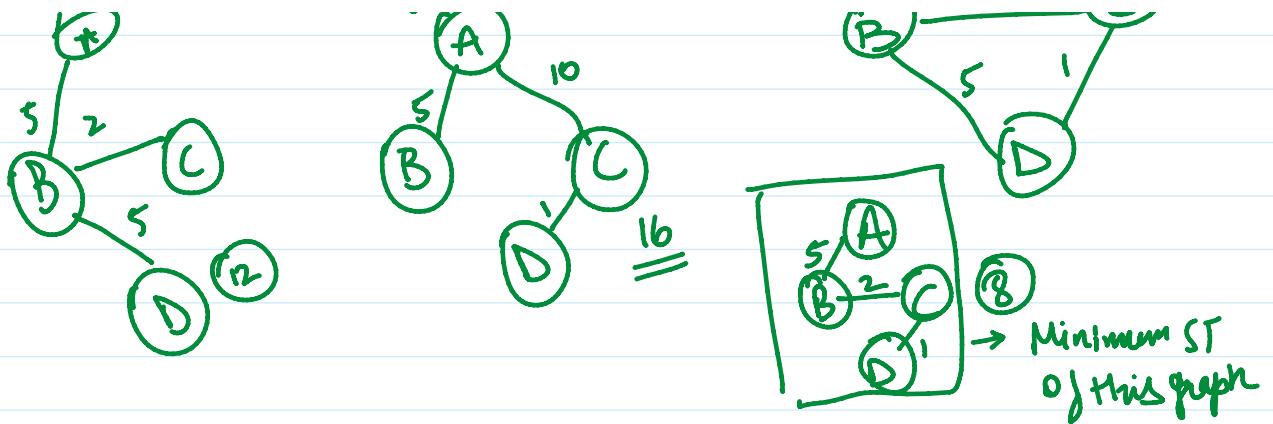
E^+ edge visit
 $E \log V$
adding E edges to PQ



TnL $\rightarrow \checkmark$

i) Minimum Spanning Trees
 \hookrightarrow V to $(V-1)$ edges st. total wt min

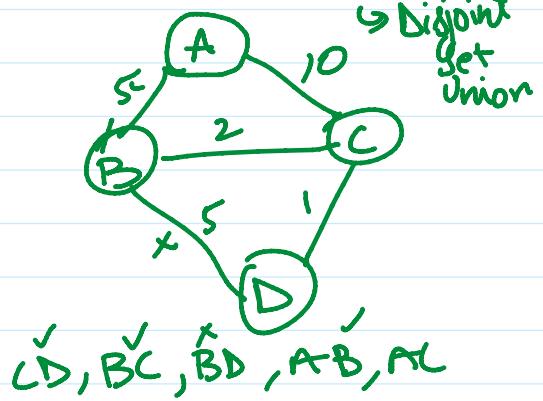
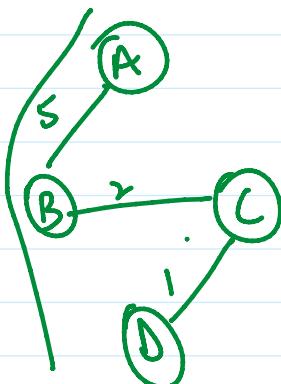
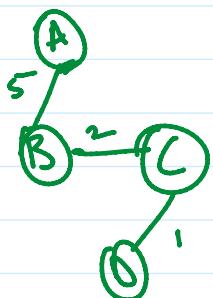




MST

✓ Prim's ✓
BFS + PQ
+ avoid cycle

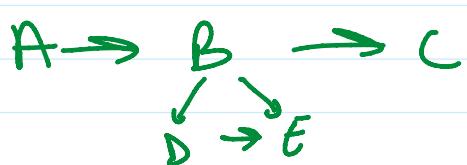
Kruskal ✓
nodes → sort wt DSU
cycle detect → UF Union Find
→ Disjoint Set Union



UF DSU *

* * Topological sort → BFS DFS

↳ Processing sort ↳ Mother Vertex



A, B, C, D, E

→ Bellman Ford X
→ single source X
→ Dijkstra ✓

→ All nodes shortest Path

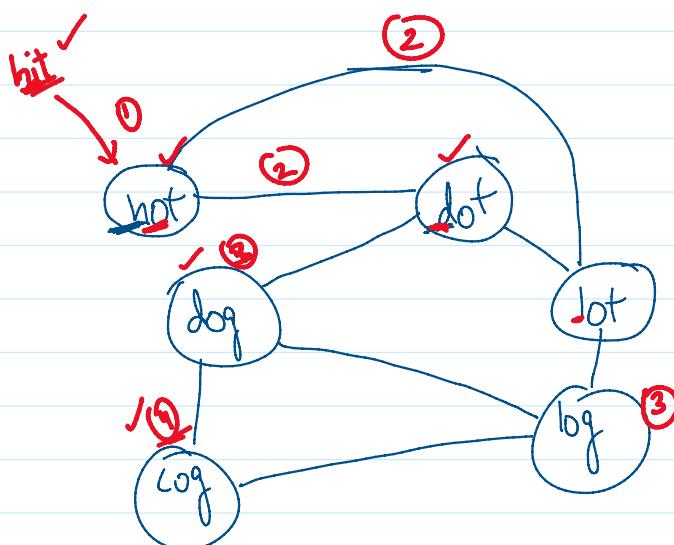
Floyd-Warshall

3D → DP

N (cont)

Input: beginWord = "hit", endWord = "cog", wordList = ["hot", "dot", "dog", "lot", "log", "cog"]

From <<https://leetcode.com/problems/word-ladder/>>



Shortest
BFS
 $M + 26 \times O(N^M)$ 50000

cop
not ↗ ot
not
got
dot
cot
fat
got
hat

$$5000 \times 10^{26} \text{ (5000 on 10)}$$

to Searching for each word

True

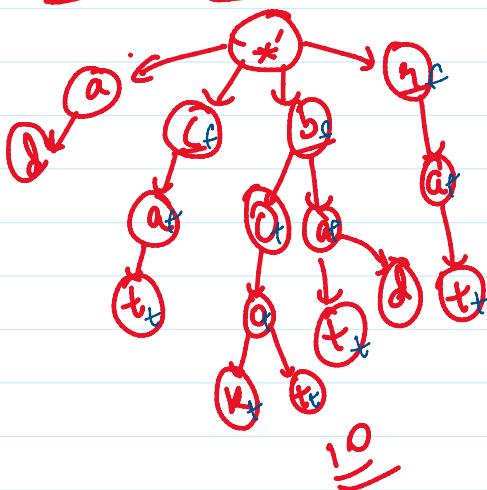
↳ 1.100 & 1.000 K

Two Models

Tree

Word search

{
cat
boat
rat
book
fish
look
car



Tree

addWord
findWord

Tree Node {

char ch;
boolean end;
H-M children
↳ ch, Tree }