Date) 21/02/23

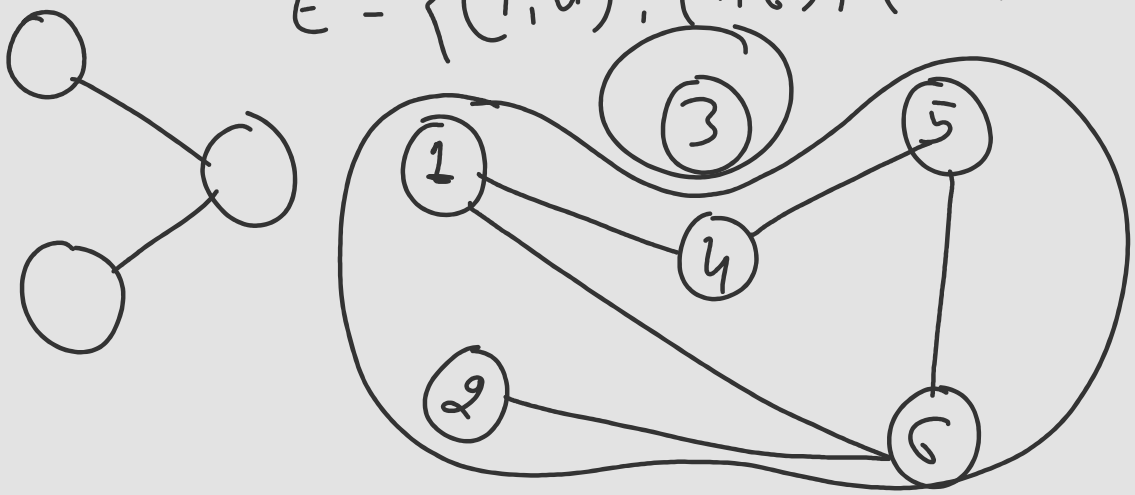
§ Data Structures §

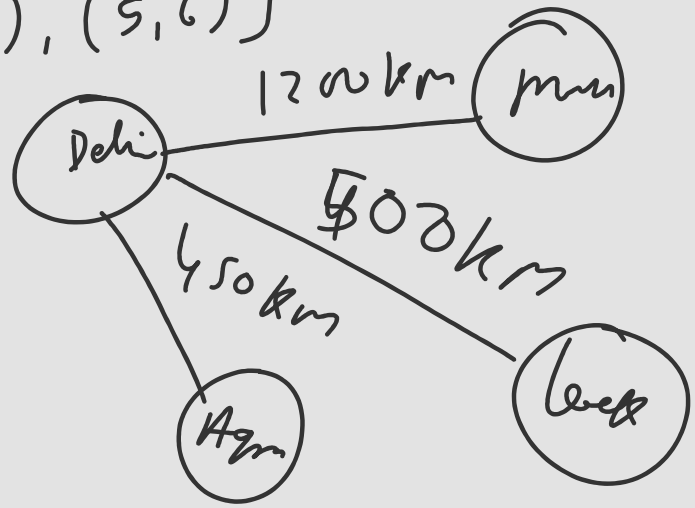
Graphs: Railways, Social networks, Road transportation etc

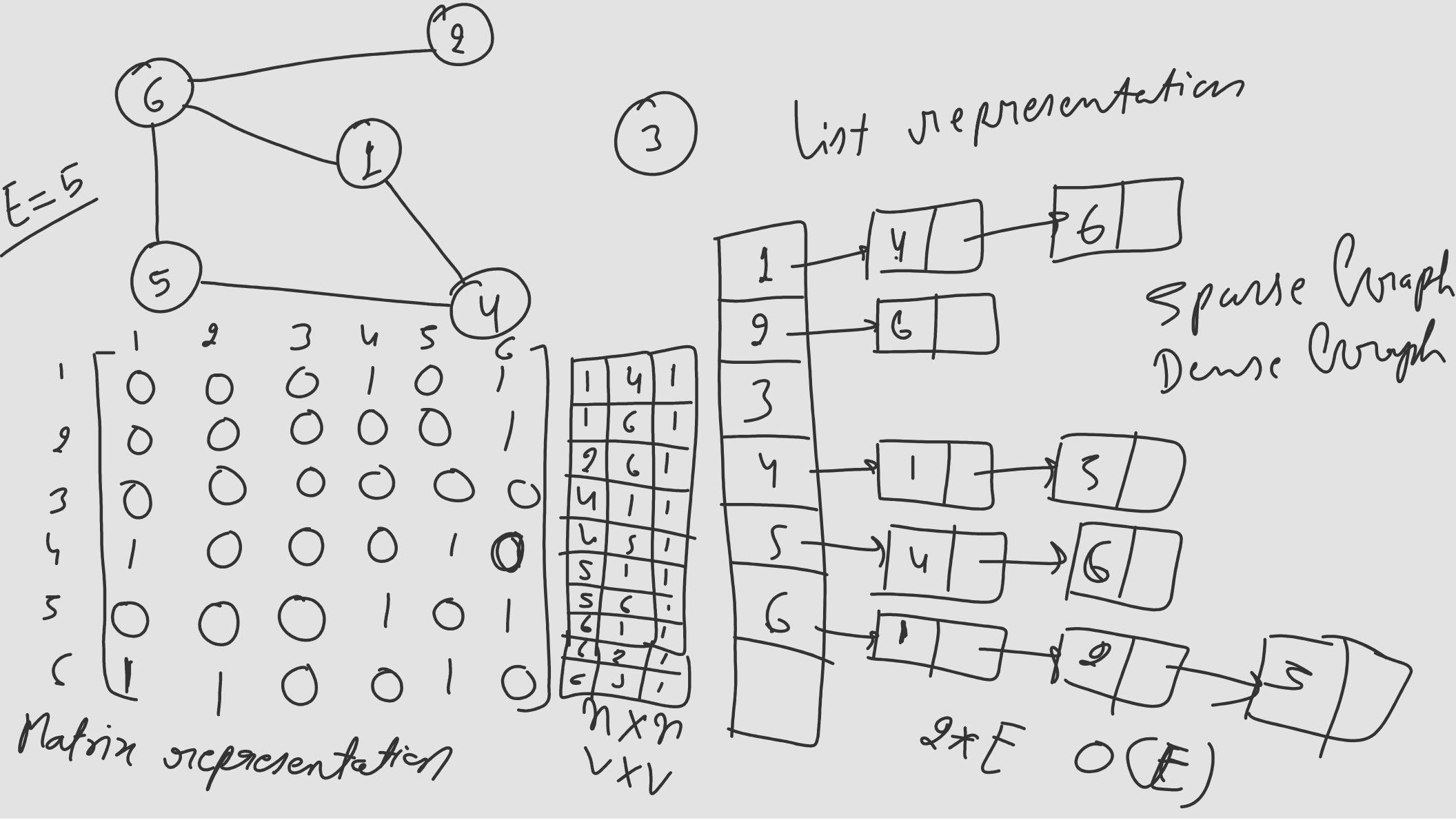
A Graph is an ordered pair G(V, E) comprising a set V of vertices and a collection of pair of vertices. Known as edges.

$V = \{1, 2, 3, 4, 5, 6\}$

$E = \{(1,4), (1,6), (2,6), (4,5), (5,6)\}$



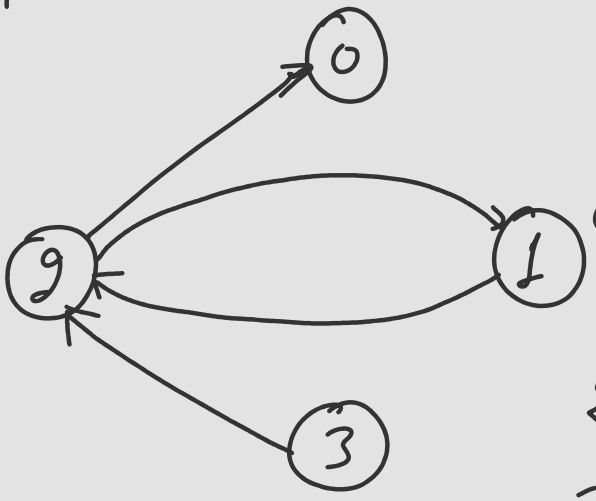



E=5
2
6
1
3
5
4
List representation
1
2
3
4
5
6
Sparse Graph
Dense Graph
Matrix representation
n x n
V x V
2*E
O(E)

§ Types of Graph:

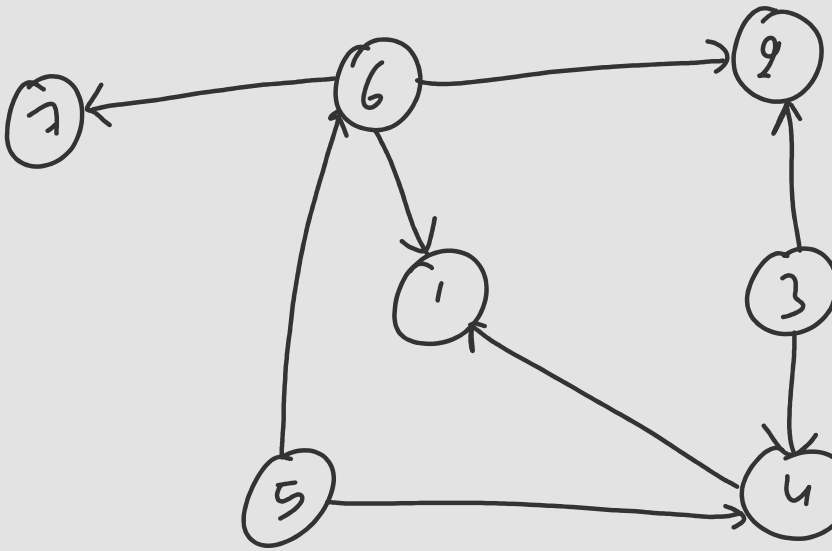
i) Directed
ii) Undirected.

Directed Graph: A directed Graph is graph in which edges have orientation i.e. Edge (x, y) is not identical to Edge (y, x).

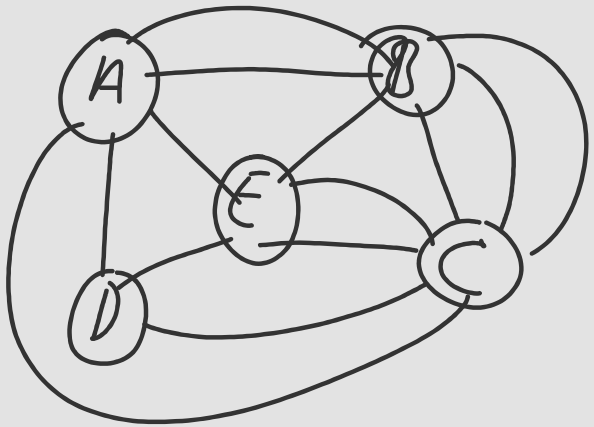


	0	1	2	3
0	0	0	0	0
1	0	0	1	0
2	1	1	0	0
3	0	0	1	0

§ Directed Acyclic Graph (DAG)



multigraph

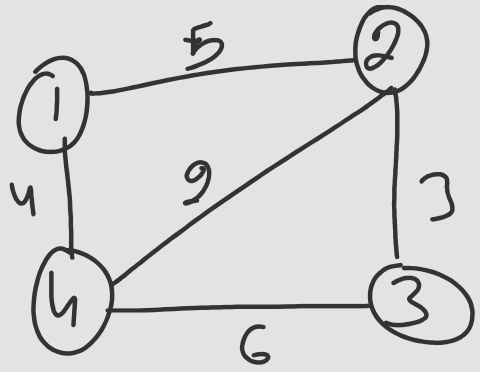


C

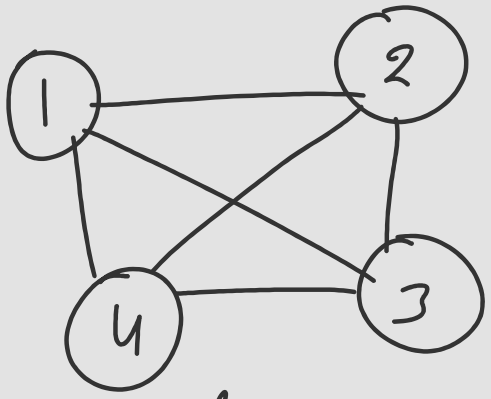
B [1+1]

Complete Graph::

Weighted graph::



	1	2	3	4
1	0	5	0	4
2	5	0	3	2
3	0	3	0	6
4	4	2	6	0

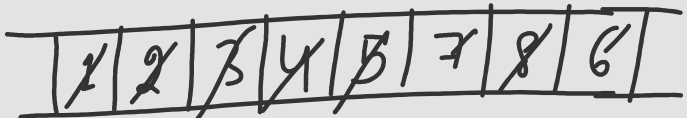


No. of Edges $= \frac{n(n-1)}{2}$

How to Explore or traverse the graph.

BFS (Breadth first Search)

Visit : 1, 2, 3, 4, 5, 7, 8, 6

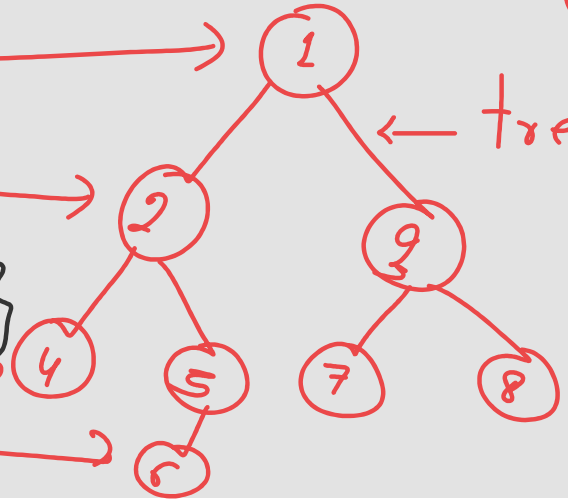


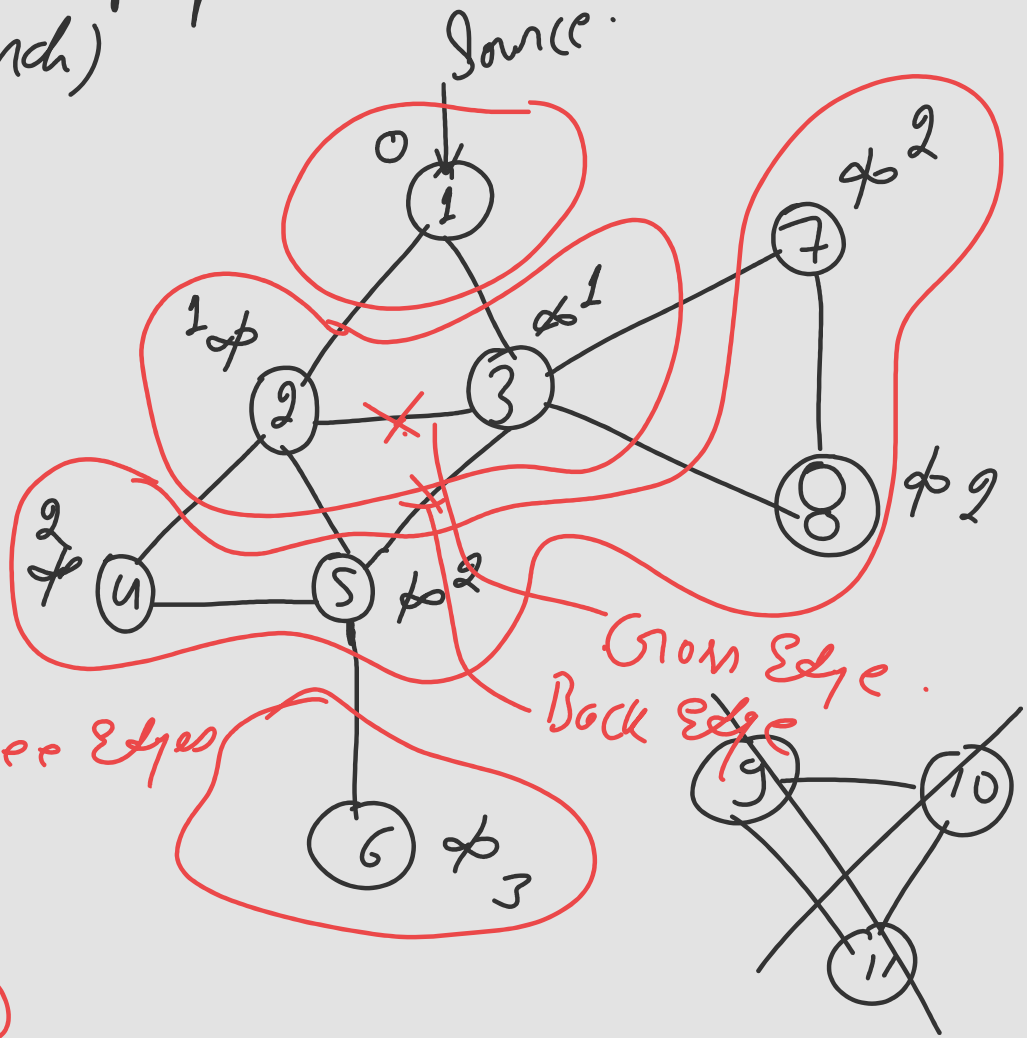
$L_0 = \{1\}$

$L_1 = \{2, 3\}$

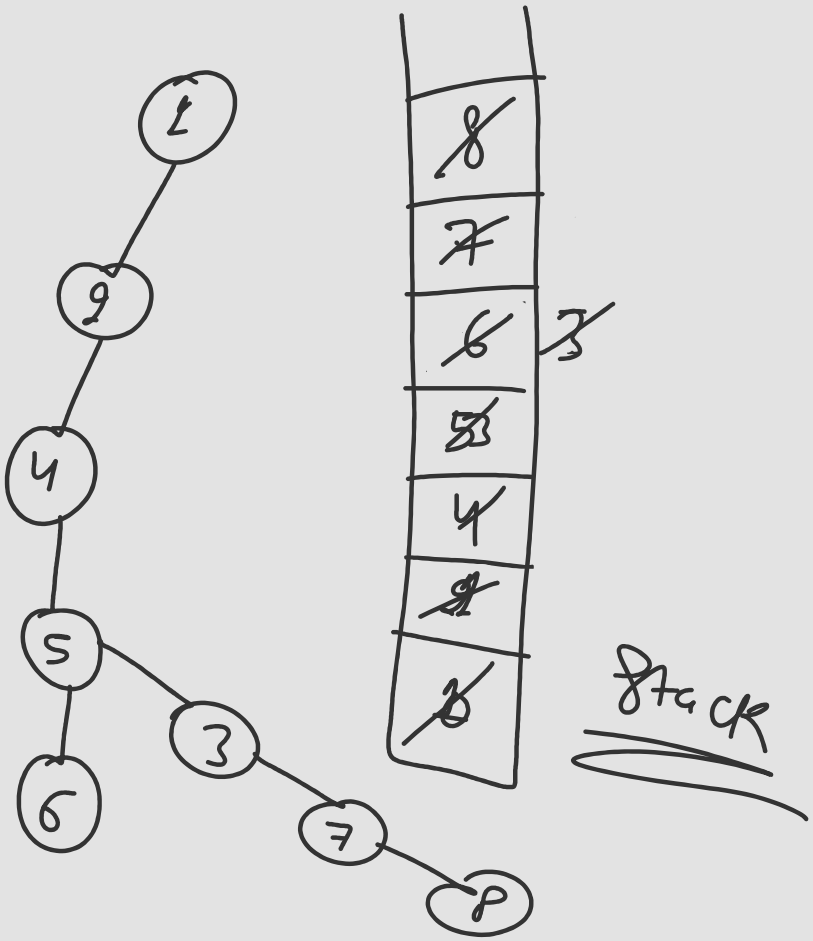
$L_2 = \{4, 5, 7, 8\}$

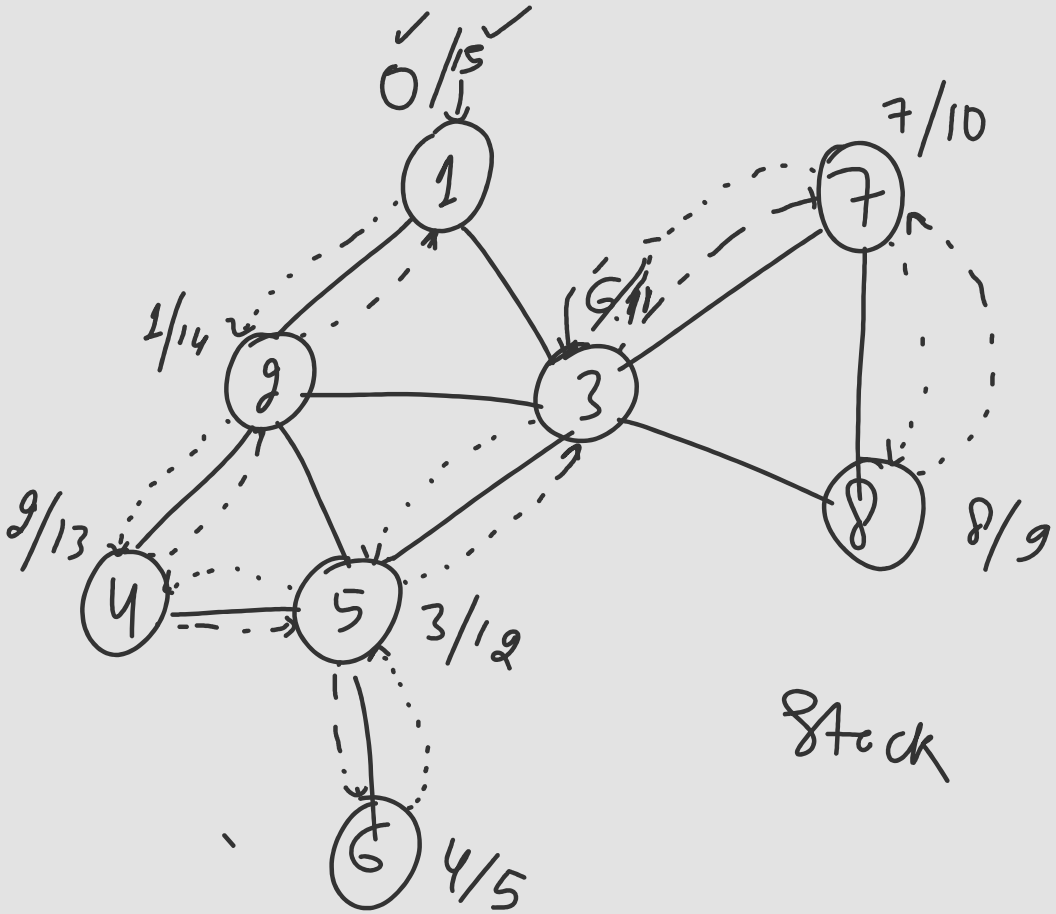
$L_3 = \{6\}$

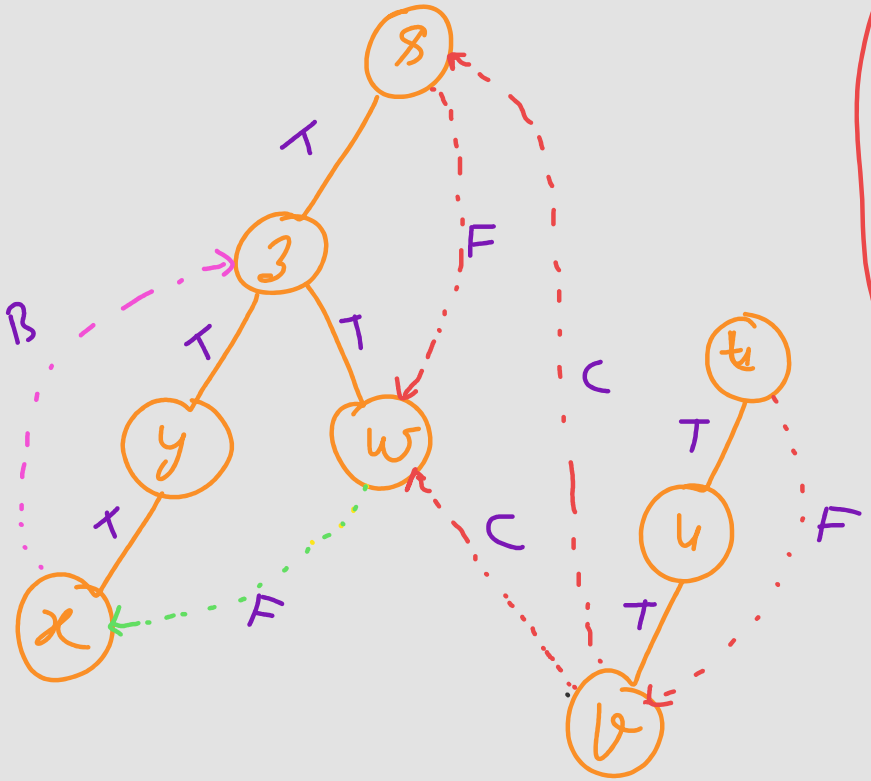


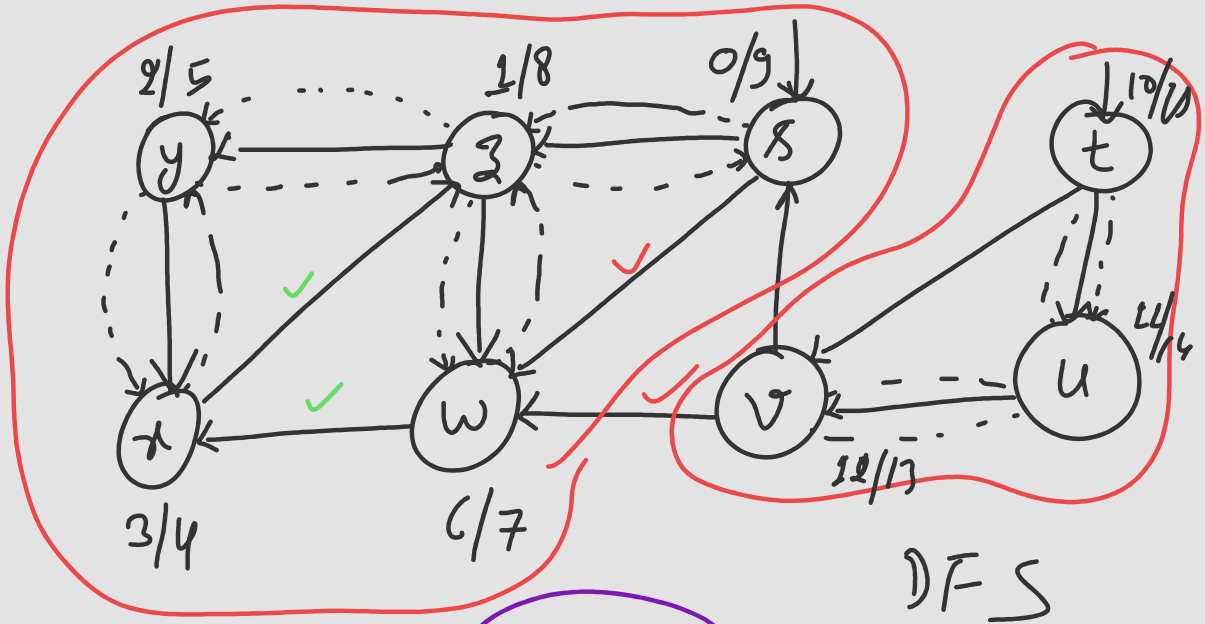


Depth first Search (DFS):









DFS

3, y, x
3, w, x