CSE 221 Algorithms: Ch6

Instructor: Saraf Anika
CSE, SoSET, EDU
Summer 2021

Graph &Tree

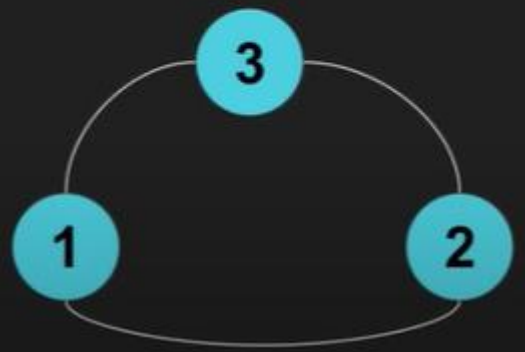
Conditions

An Undirected Graph is a tree if it has the following properties :

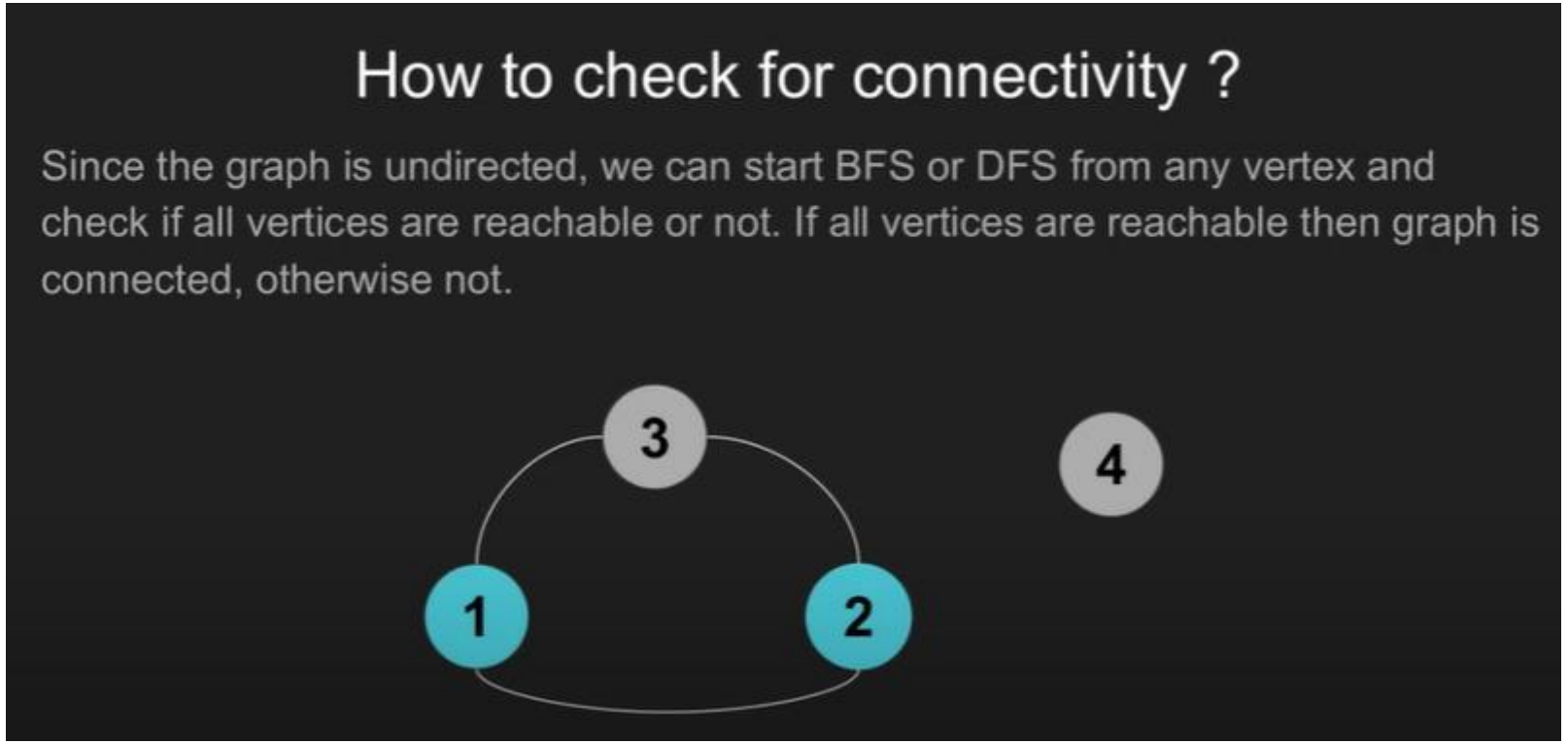
- There is no cycle.
- The graph is connected.

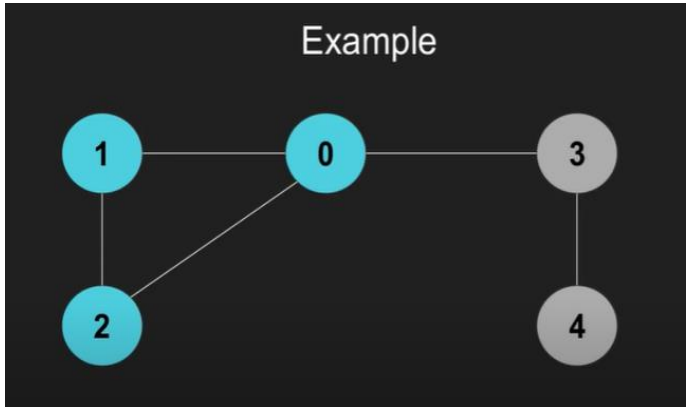
How to detect cycle in an undirected graph ?

We can either use DFS or BFS. For every visited vertex ‘v’, if there is an adjacent vertex ‘u’ such that u is already visited and u is not parent of v, then there is a cycle in graph. If we don’t find such an adjacent vertex for any vertex, we say that there is no cycle.

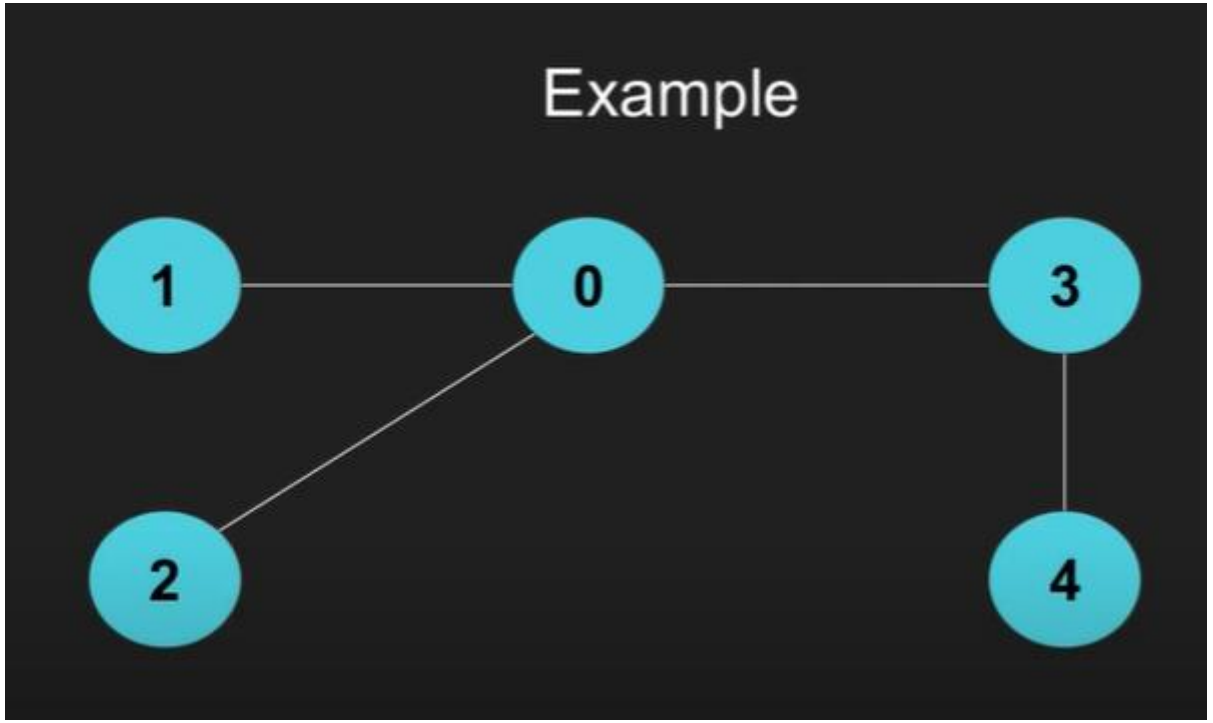


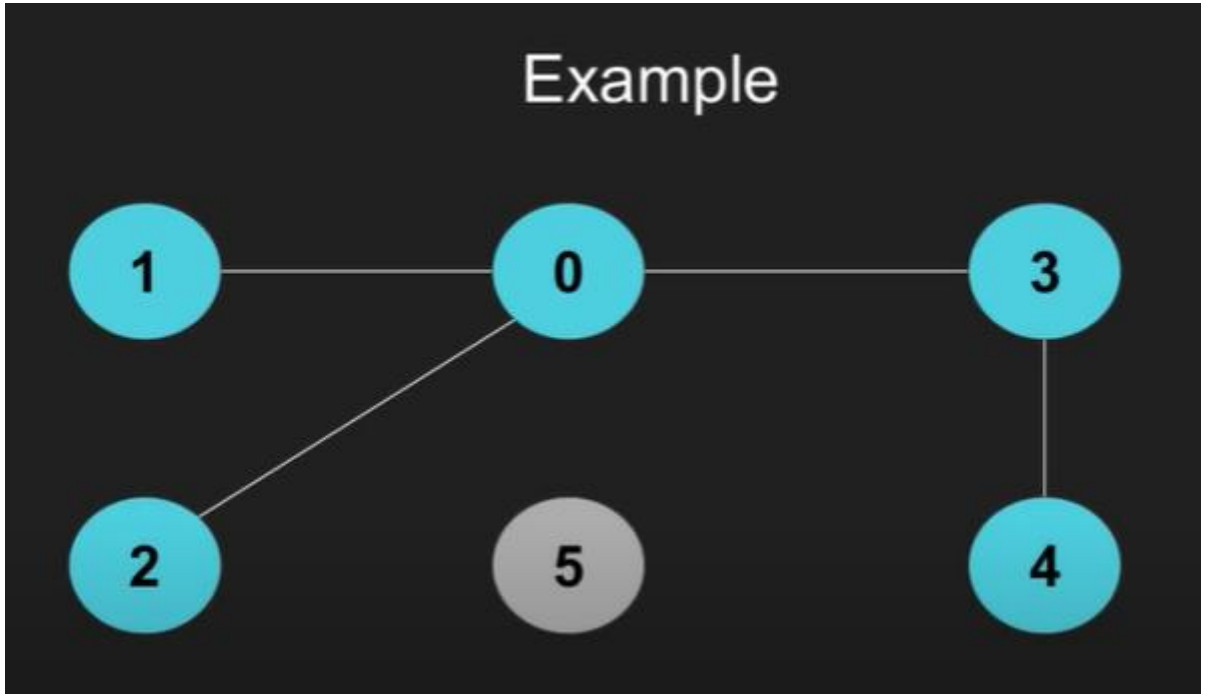
Graph &Tree


How to check for connectivity ?
Since the graph is undirected, we can start BFS or DFS from any vertex and check if all vertices are reachable or not. If all vertices are reachable then graph is connected, otherwise not.
3
4
1
2


Example
1
0
3
2
4

Graph &Tree



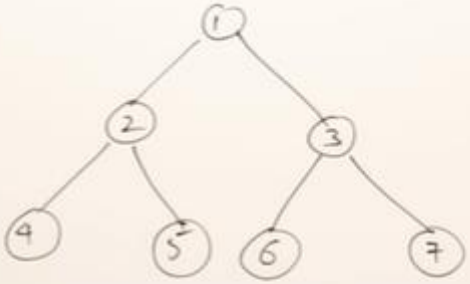


BFS & DFS

1. Visiting a Vertex
2. Exploration of Vertex

BFS: 1, 2, 4, 5, 7, 3, 6

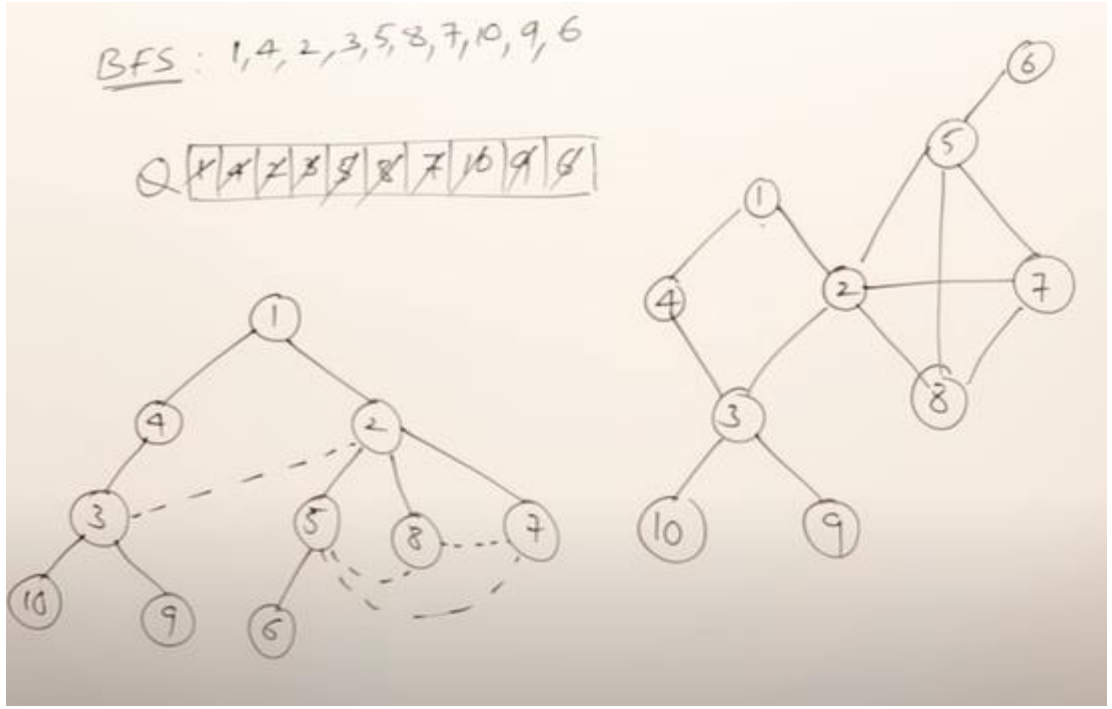
DFS: 1, 2, 3, 6, 7, 4, 5

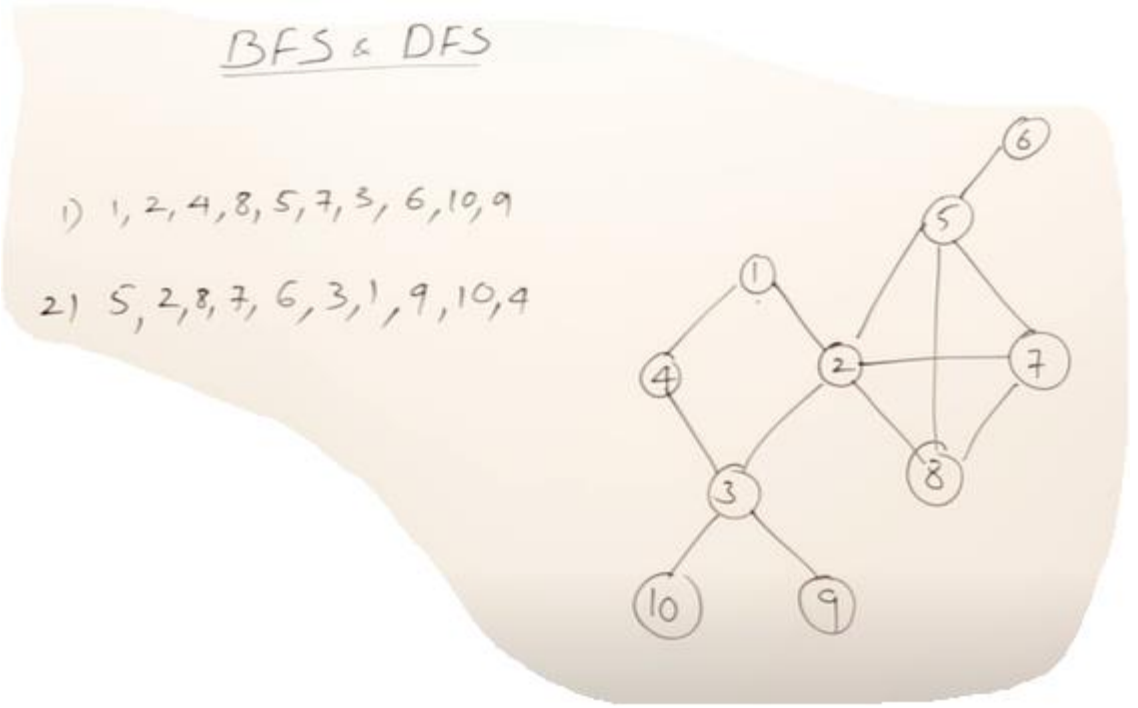


Level-order BFS: 1, 2, 3, 4, 5, 6, 7

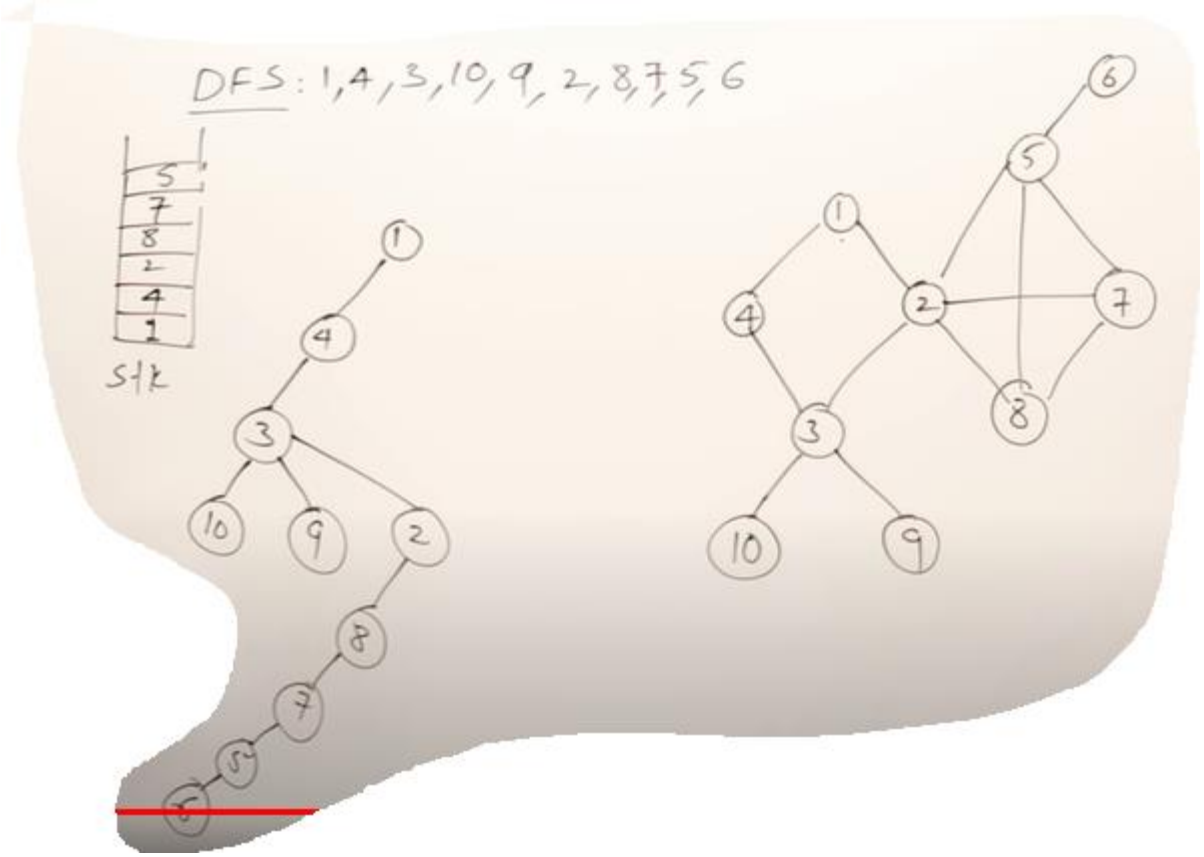
preorder DFS: 1, 2, 4, 5, 3, 6, 7

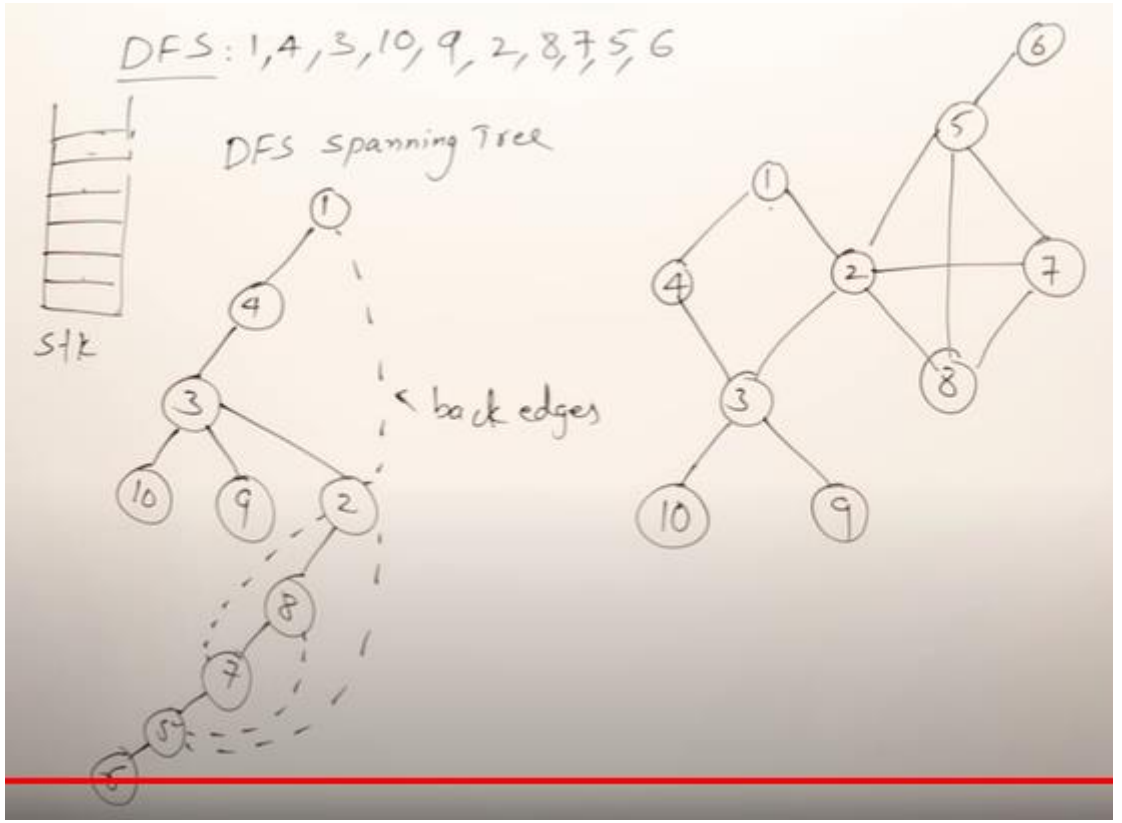
BFS & DFS


BFS : 1, 4, 2, 3, 5, 8, 7, 10, 9, 6
Q
1
4
2
3
5
8
7
10
9
6


BFS & DFS
1) 1, 2, 4, 8, 5, 7, 3, 6, 10, 9
2) 5, 2, 8, 7, 6, 3, 1, 9, 10, 4

BFS & DFS


DFS: 1,4,3,10,9,2,8,7,5,6
5
7
8
2
4
1
Stk


DFS: 1,4,3,10,9,2,8,7,5,6
DFS spanning Tree
Stk
back edges

BFS & DFS