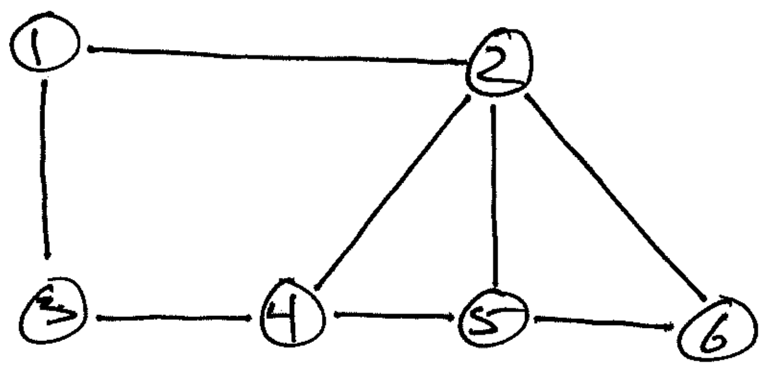
CSE 101 10-14-25

DFS

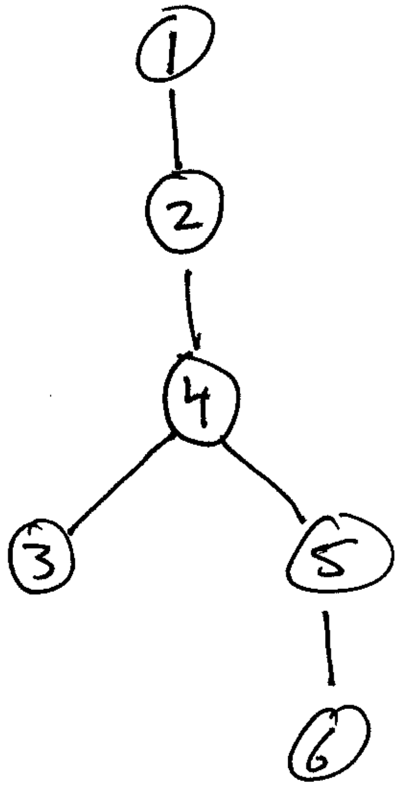
Ex.



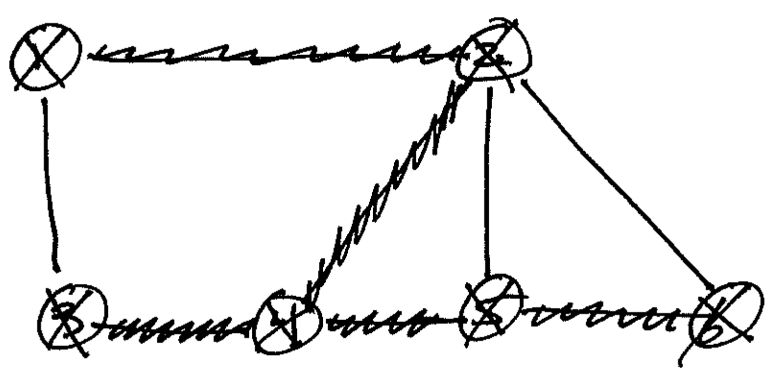
time
~~0~~
~~1~~
~~2~~
~~3~~ ~~9~~
~~4~~ ~~10~~
~~5~~ ~~11~~
~~6~~ 12
~~7~~
~~8~~

	adj	color	Parent	d	f
1	2 3	~~w~~ ~~g~~ b	~~N~~	1	12
2	1 4 5 6	~~w~~ ~~g~~ b	~~N~~ 1	2	11
3	1 4	~~w~~ ~~g~~ b	~~N~~ 4	4	5
4	2 3 5	~~w~~ ~~g~~ b	~~N~~ 2	3	10
5	2 4 6	~~w~~ ~~g~~ b	~~N~~ 4	6	9
6	2 5	~~w~~ ~~g~~ b	~~N~~ 5	7	8

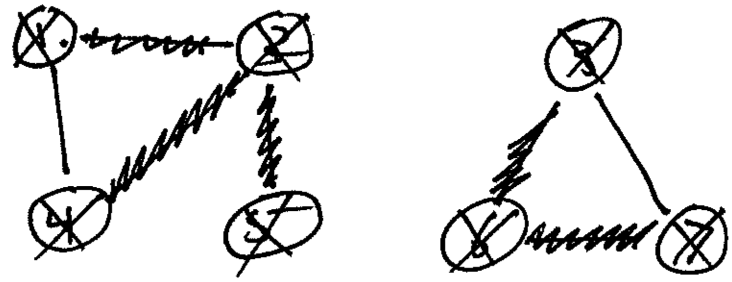
DFS forrest



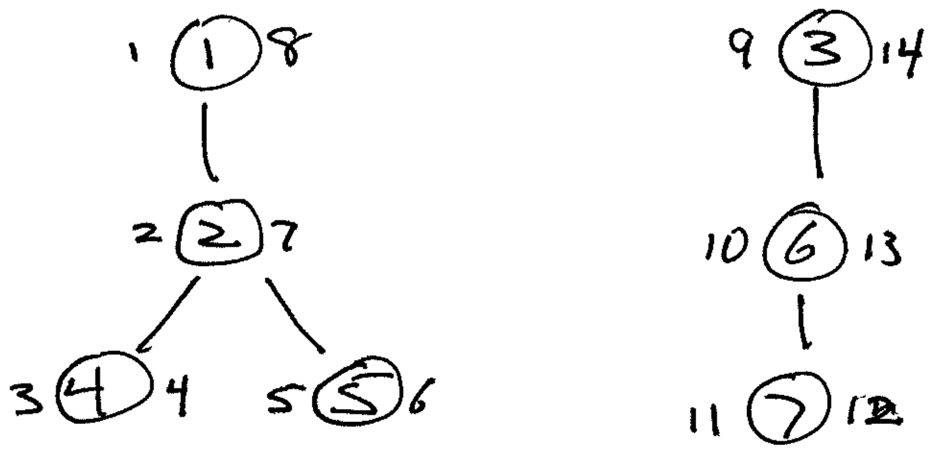
EX same, again



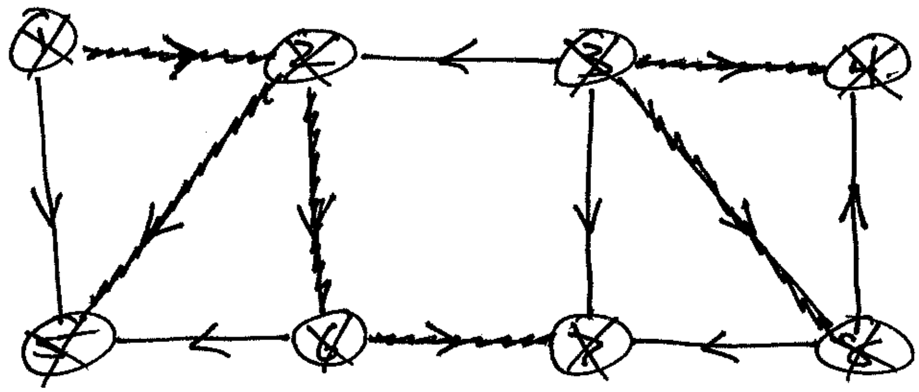
Ex.



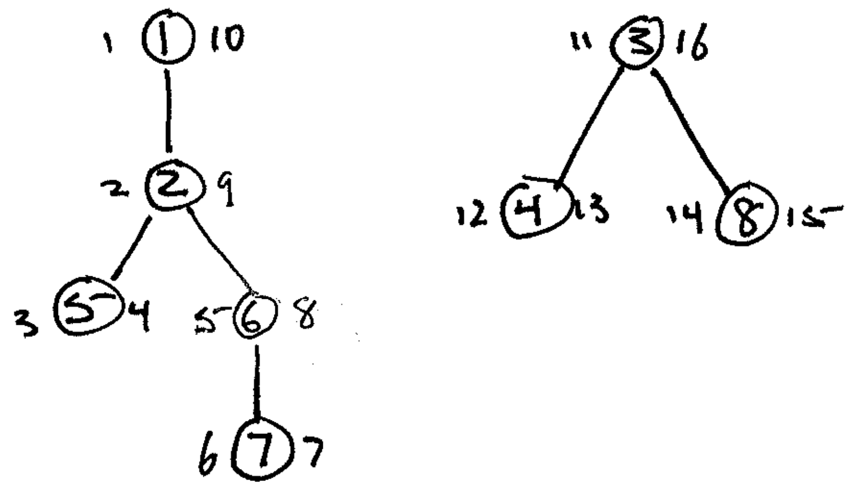
DFS forest



Ex.



Forest



Defn

A digraph G is called **strongly connected** iff for all $x, y \in V(G)$ y is reachable from x and x is reachable from y.

More generally:

Defn

$U \subseteq V(G)$ is called **strongly connected** iff for all $x, y \in U$, y is reachable from x and x from y.

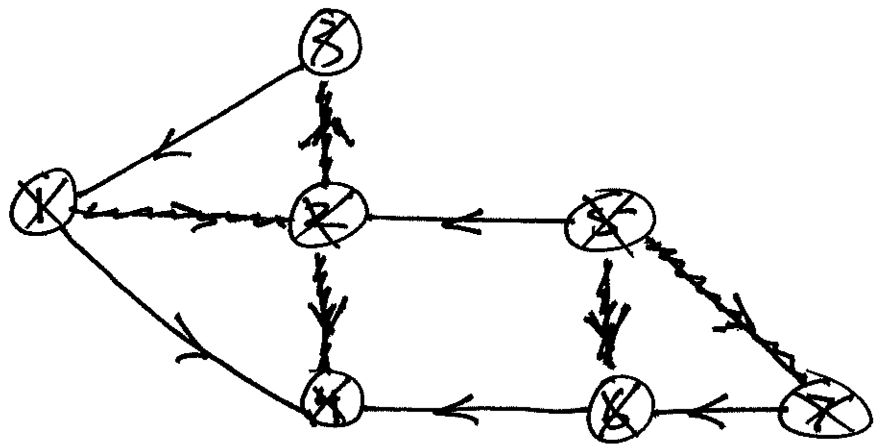
<u>Defn</u>

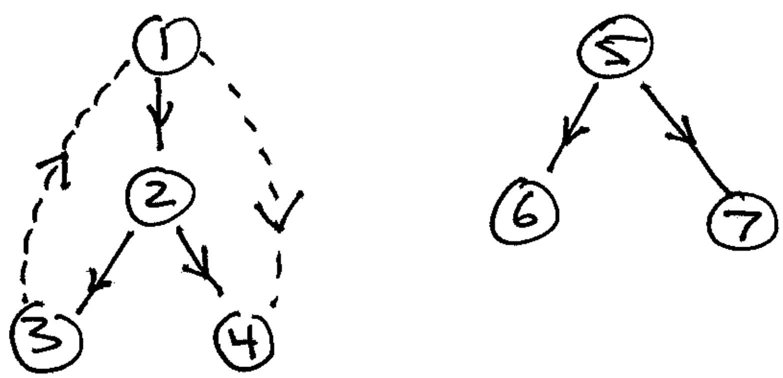
$U \subseteq V(G)$ is called a <u>strongly connected component</u> (SCC) iff

(1) U is <u>strongly</u> conn.

(2) U is maximal w.r.t. (1)

Ex. (edge classification)





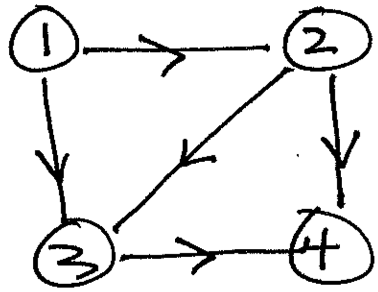
Tree: (1,2), (2,3), (2,4), (5,6), (5,7)

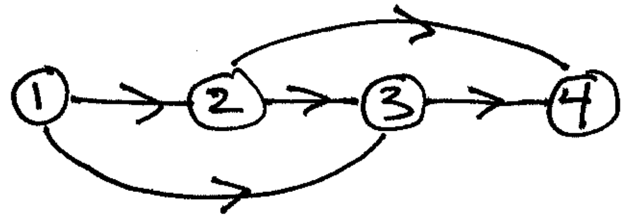
Back: (3,1)

Forward: (1,4)

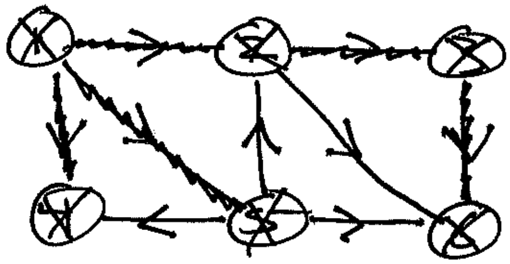
Cross: $\underbrace{(5,2), (6,4)}$ $\underbrace{(7,6)}$

Ex. Topological sort





Ex.



stack

1
5
4
2
3
6

forest