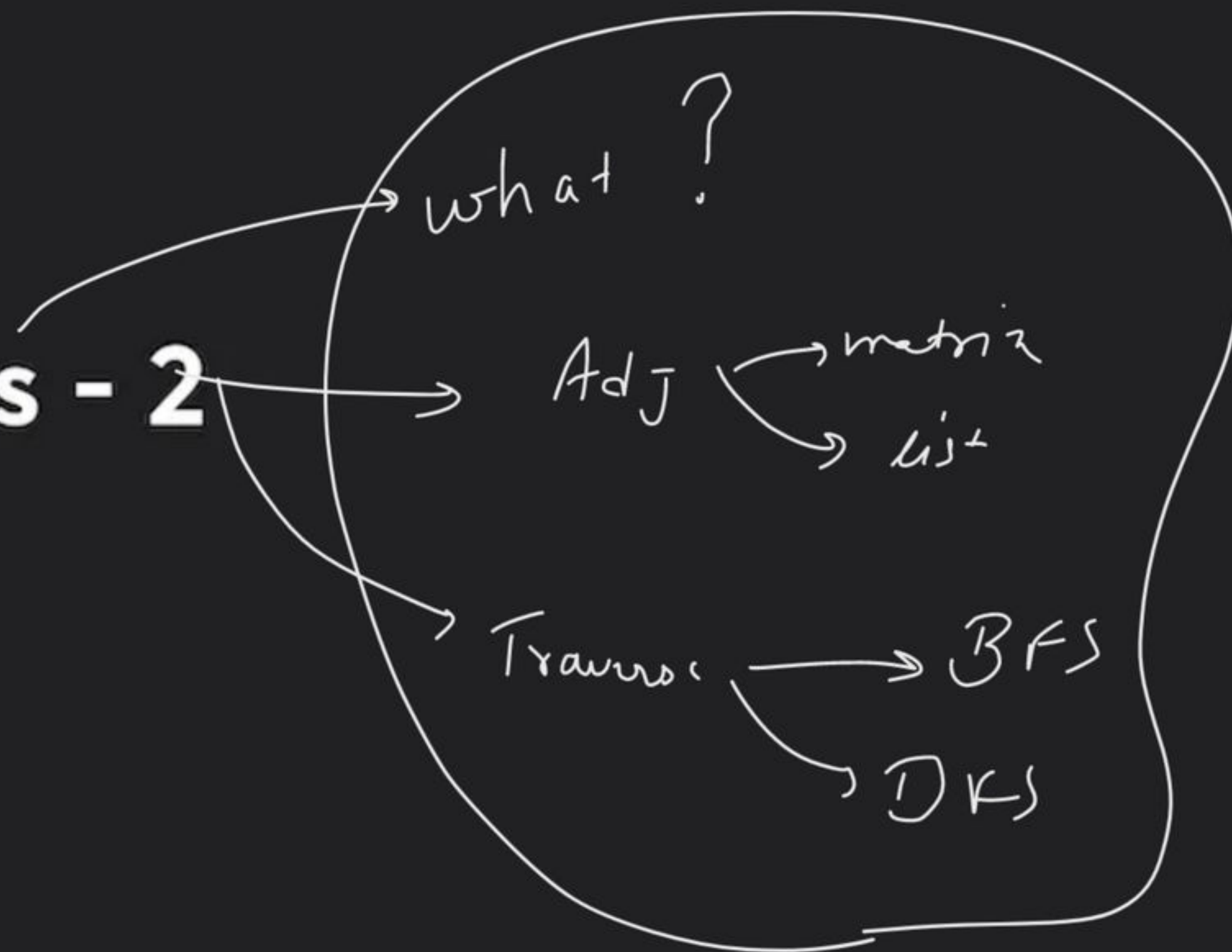


Graphs Class - 2

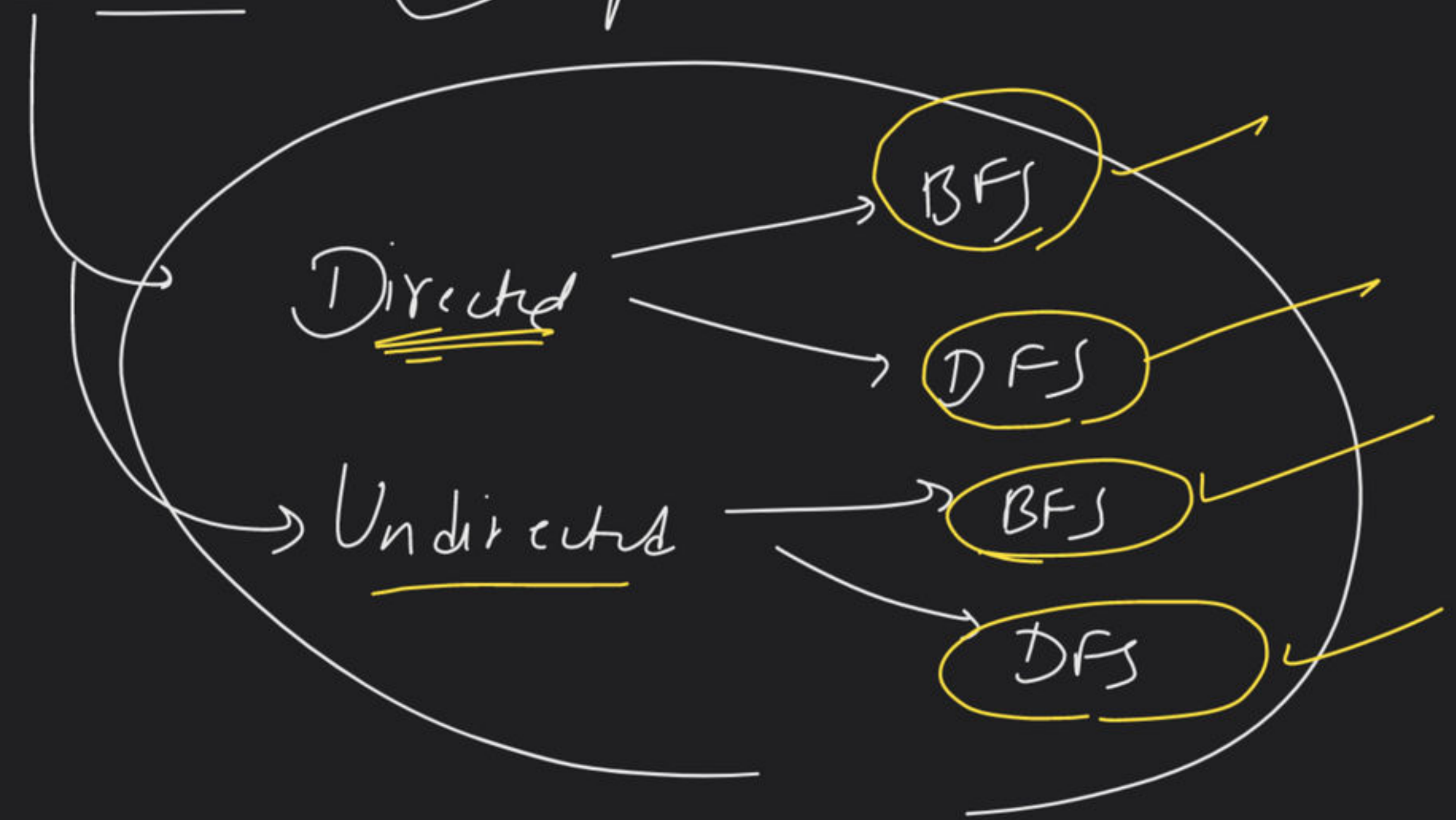
Special class





Cycle

Detection: (Fp)

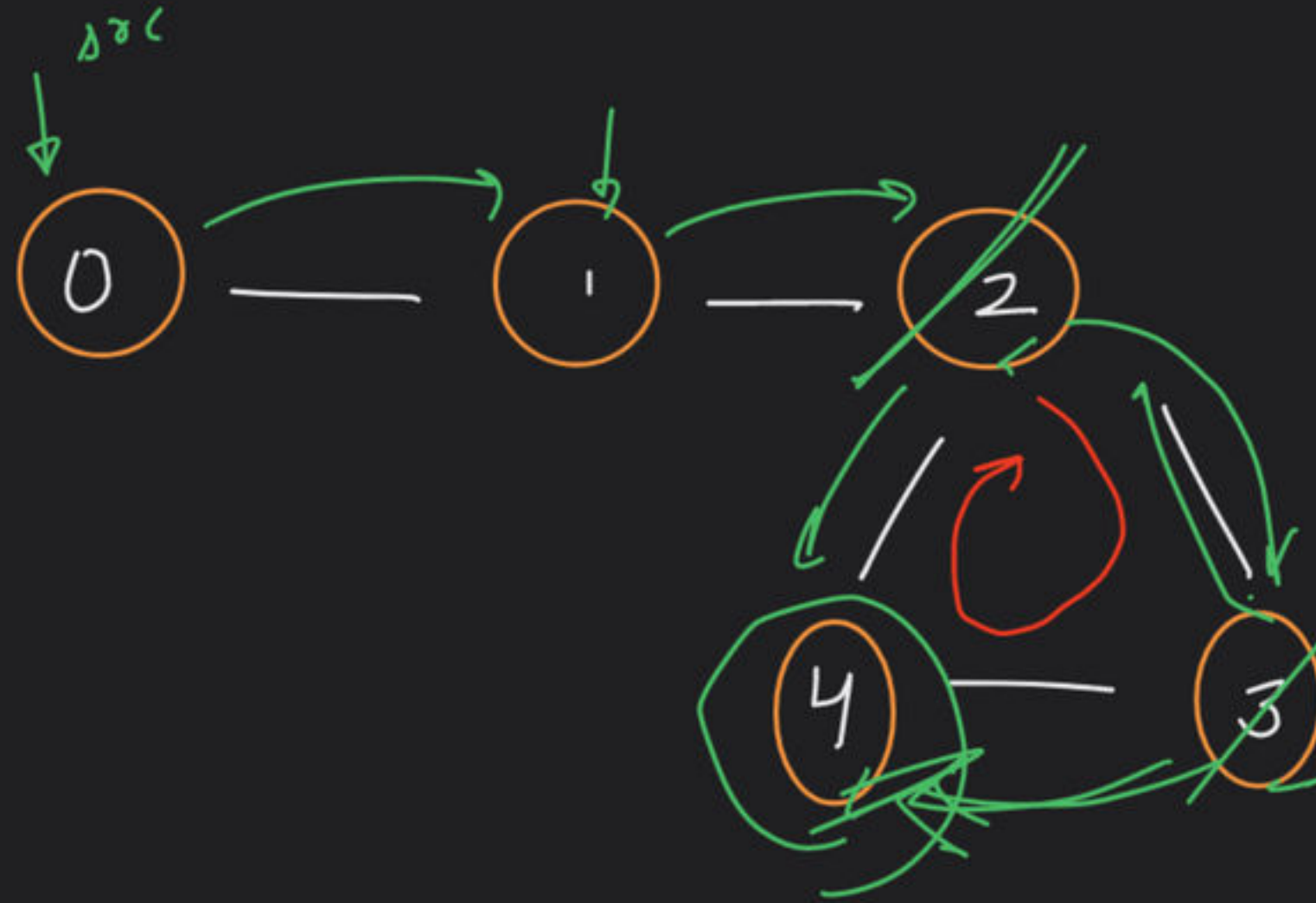


→ Undirected

graphs:

→ BFS
→ DFS

Cycle → $\begin{matrix} 2-3 \\ | \\ 4 \end{matrix}$



→ already visited & Not parent

Visited
0 → True
1 → True
2 → T
3 → T
4 → T ✓

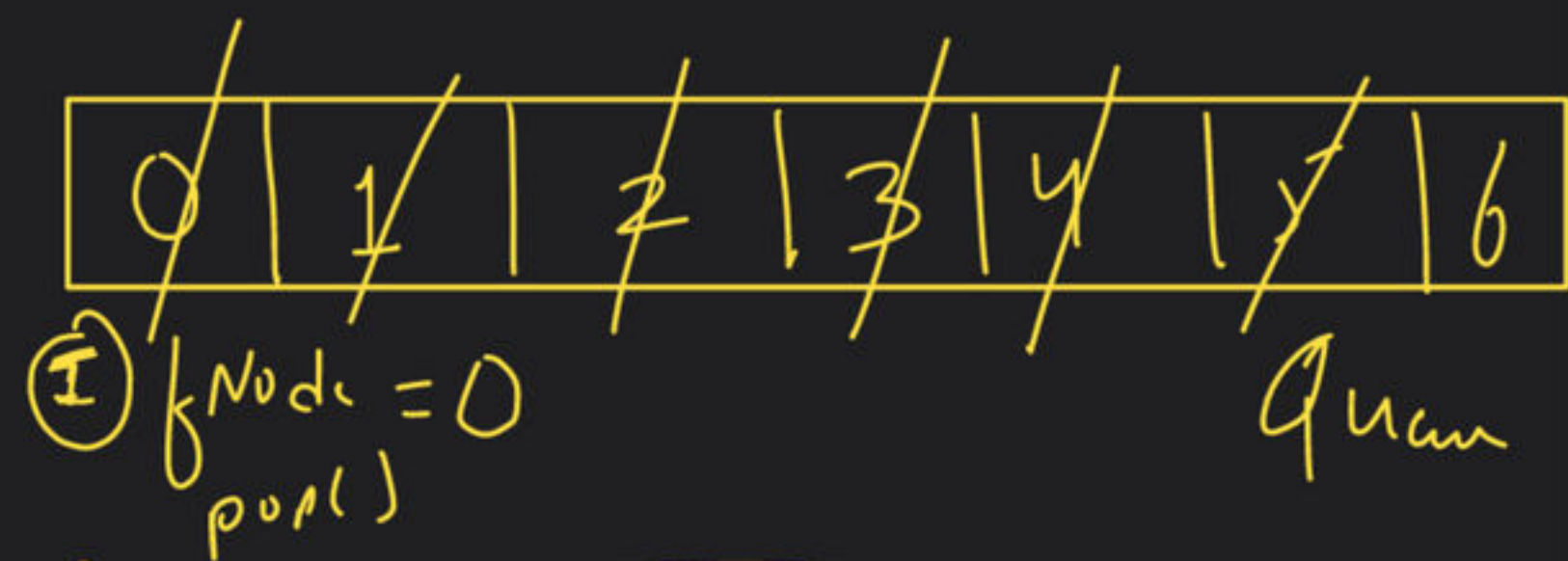
initd shv
 → g → creat
 → 2: published
 → vis, (src) = T
 → post (src) = -1

Visited

0 → ~~F~~ True
 1 → ~~F~~ True
 2 → ~~F~~ T
 3 → ~~F~~ T
 4 → ~~F~~ T
 5 → ~~F~~ T
 6 → ~~F~~ T



already visited



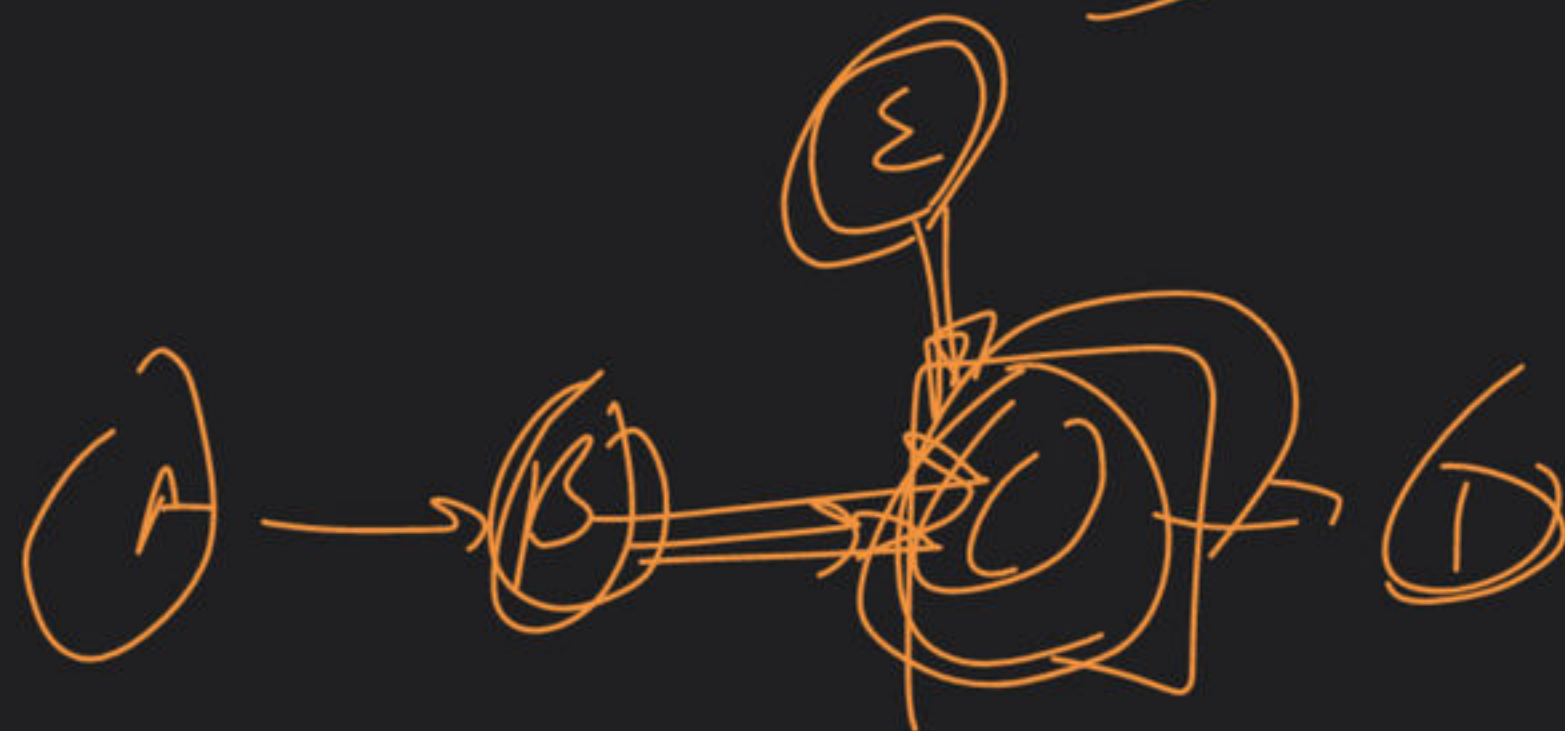
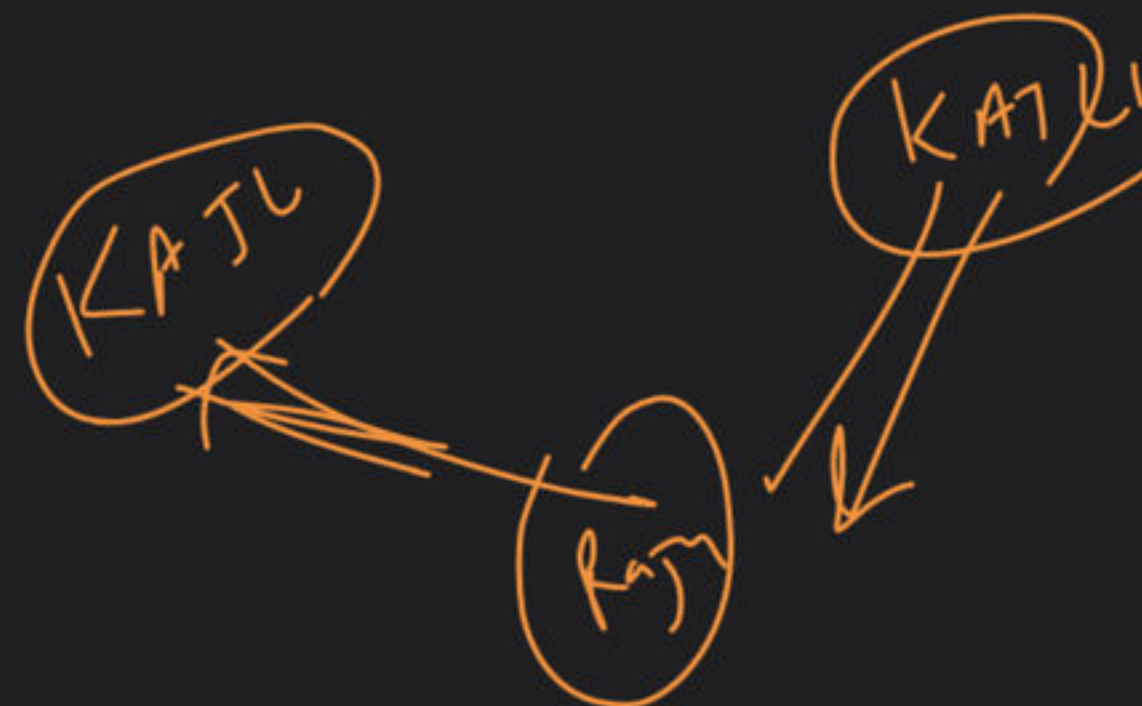
① Node = 0
poll()

Parent

0 → -1
 1 → 0
 2 → 1
 3 → 2
 4 → 3
 5 → 4
 6 → 5

Adj List

0 → 1
 1 → 0, 2, 3
 2 → 1
 3 → 1, 4, 5
 4 → 3, 6
 5 → 3, 6
 6 → 4, 5



$\text{parent}(B) = A$
 $\text{parent}(C) = B$
 $\text{parent}(D) = C$

$B \rightarrow \text{parent} \rightarrow A$

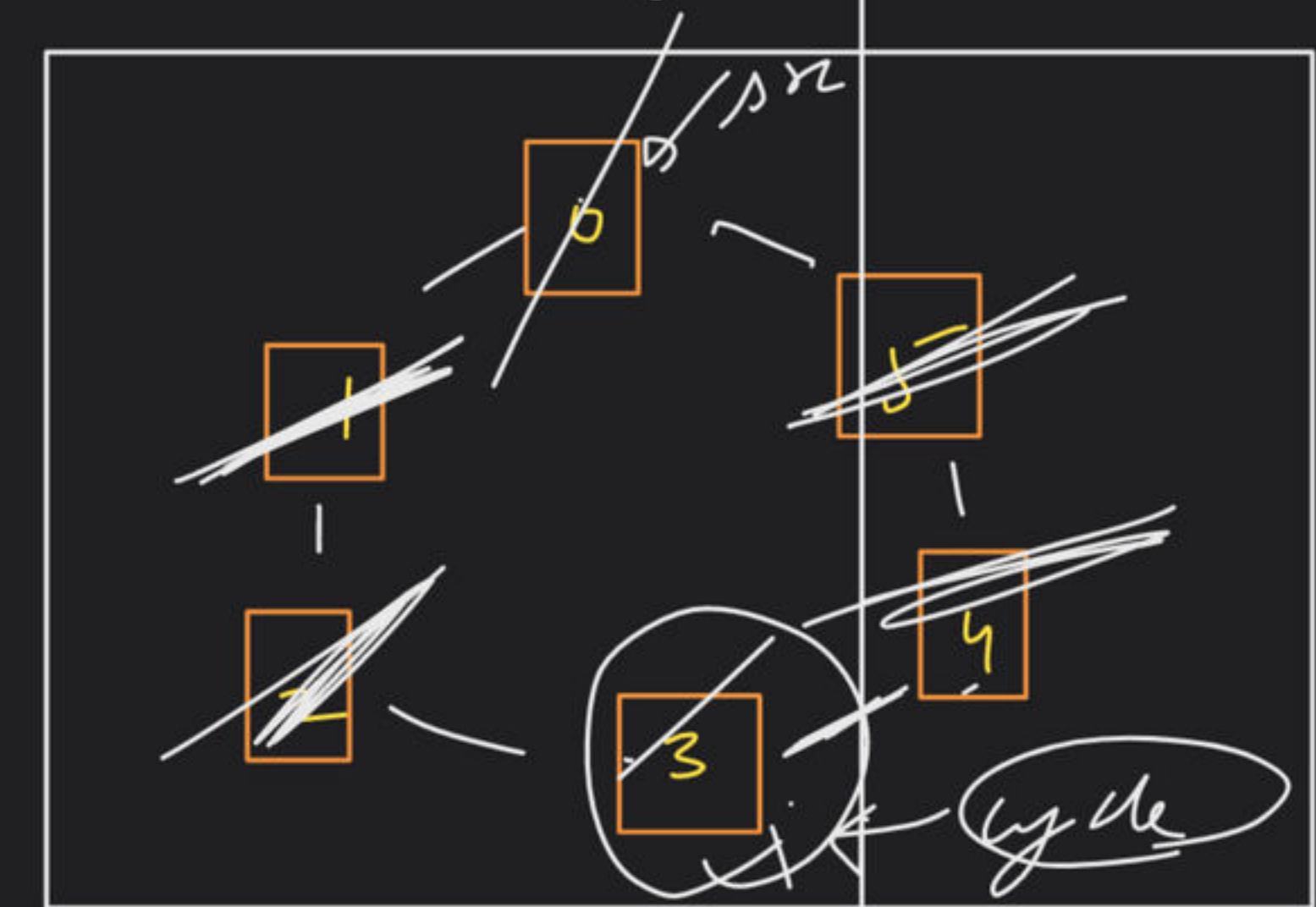
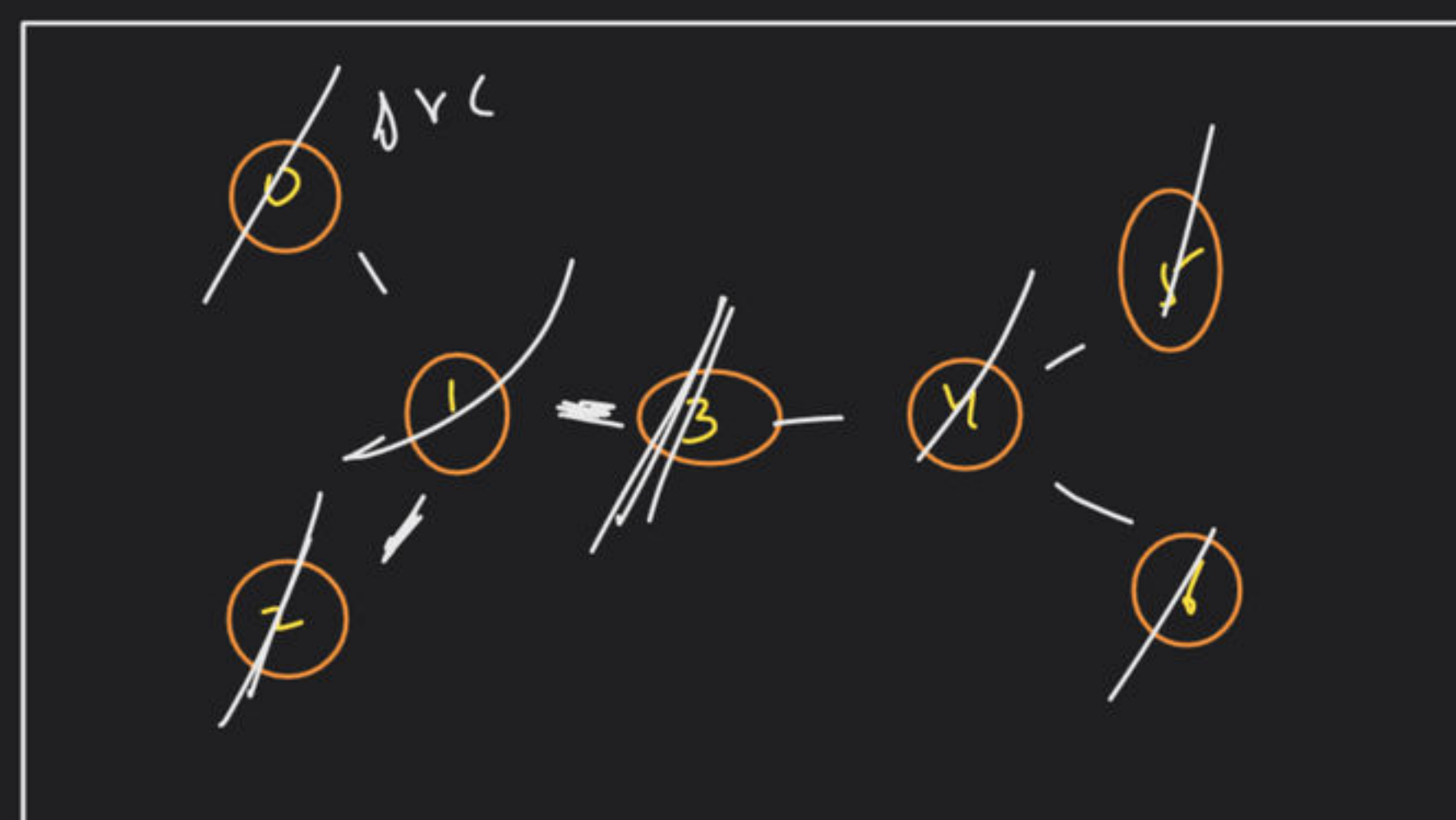
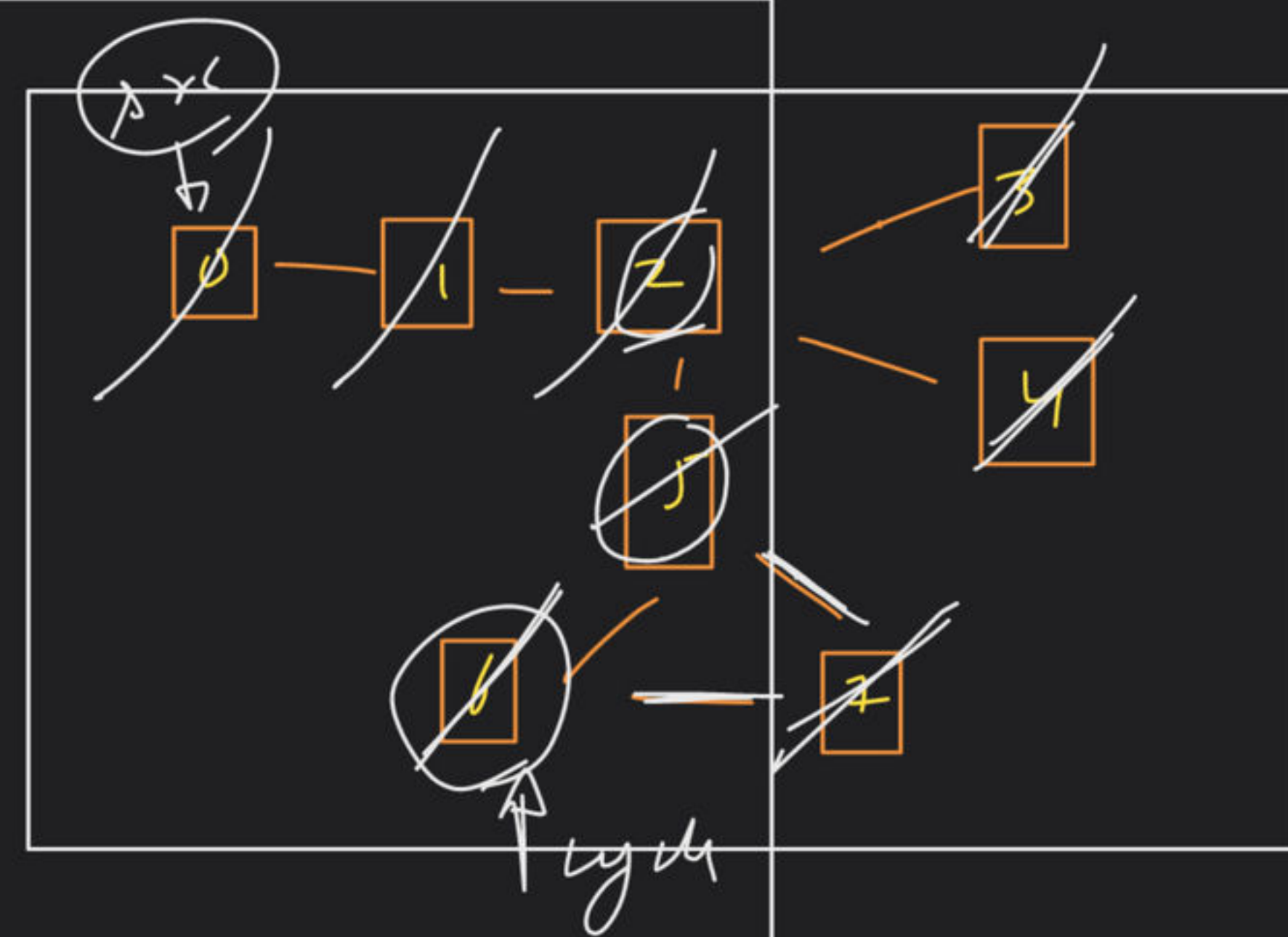
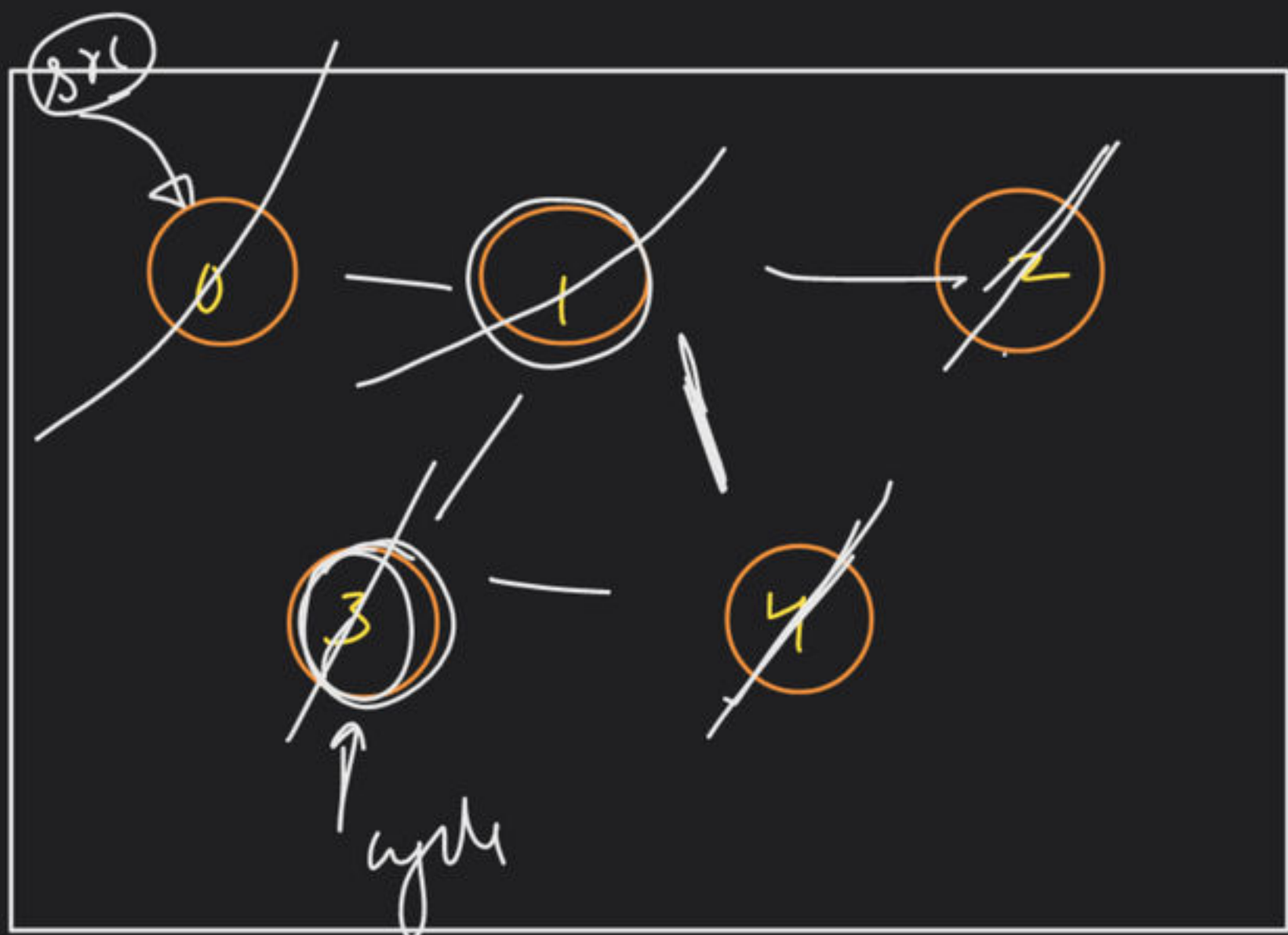
Cyclic

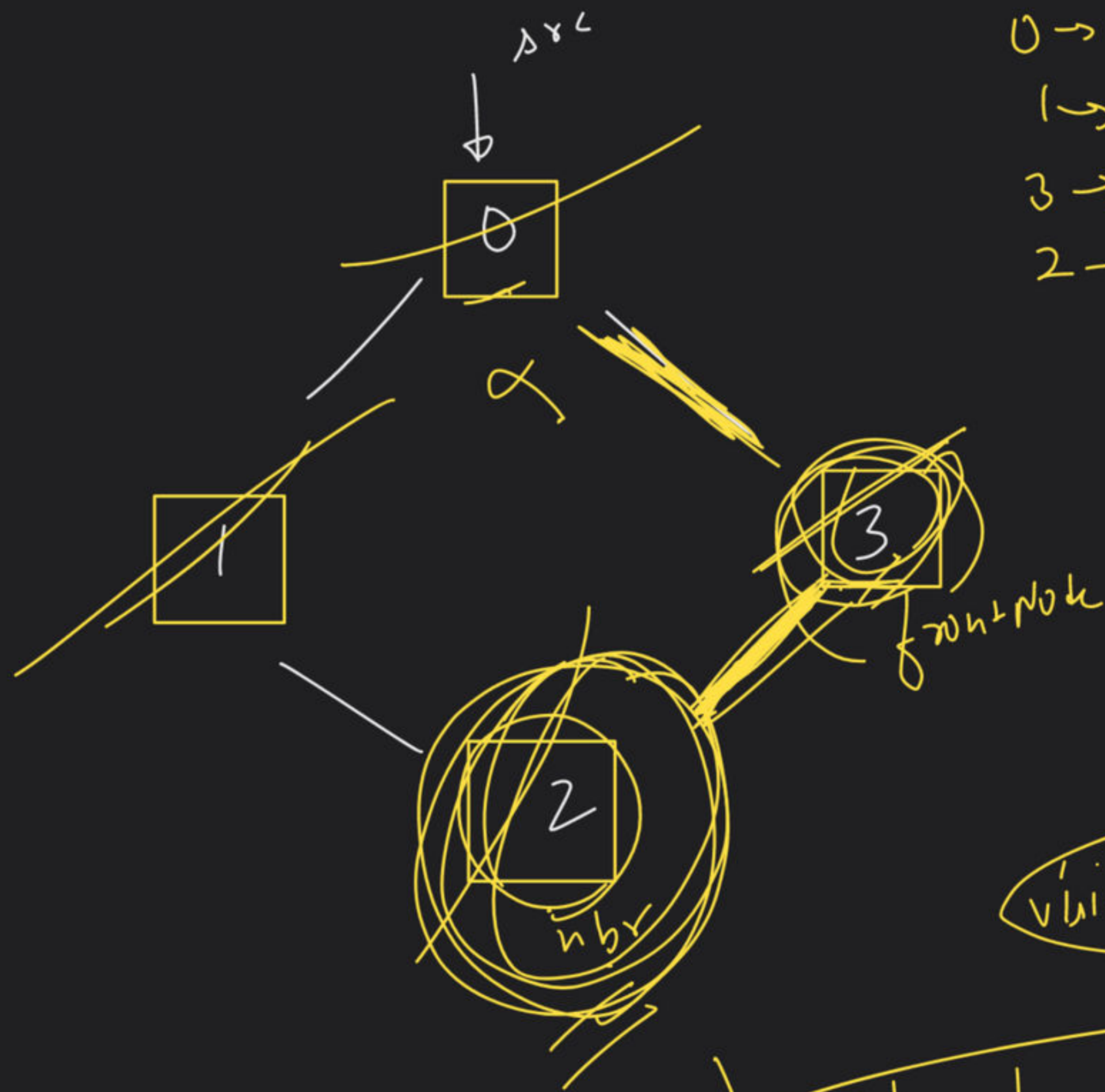
→ path 1KHz
from diff
part

Non-cyclic

→ Single Node

↑
twice





$0 \rightarrow -1$
 $1 \rightarrow 0$
 $3 \rightarrow 0$
 $2 \rightarrow T$

$0 \rightarrow T$
 $1 \rightarrow T$
 $3 \rightarrow +$
 $2 \rightarrow T$

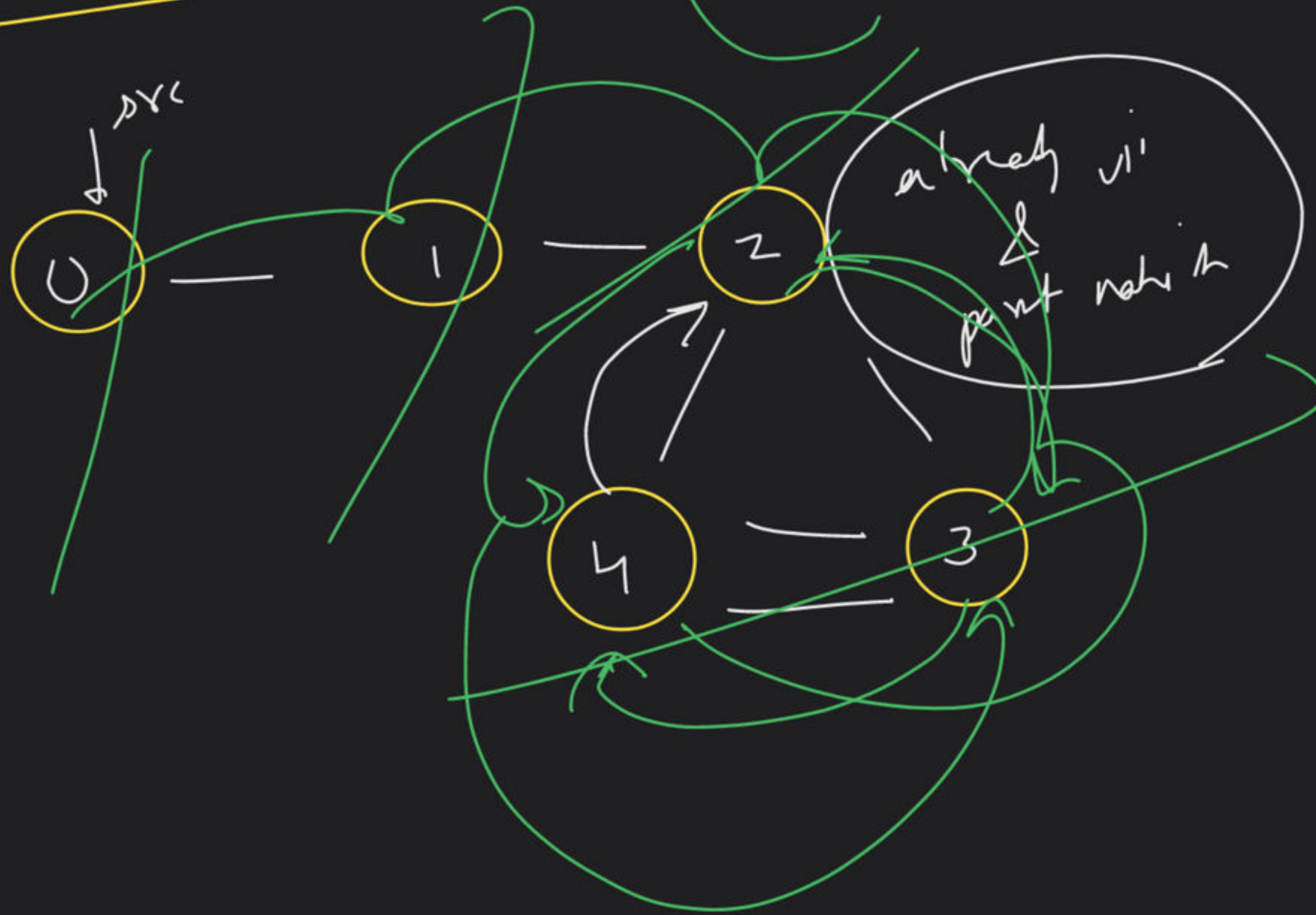
$visited[nbr] == true$

$nbr != parent[frontNode]$

Undirected



DFS



dfs(0)

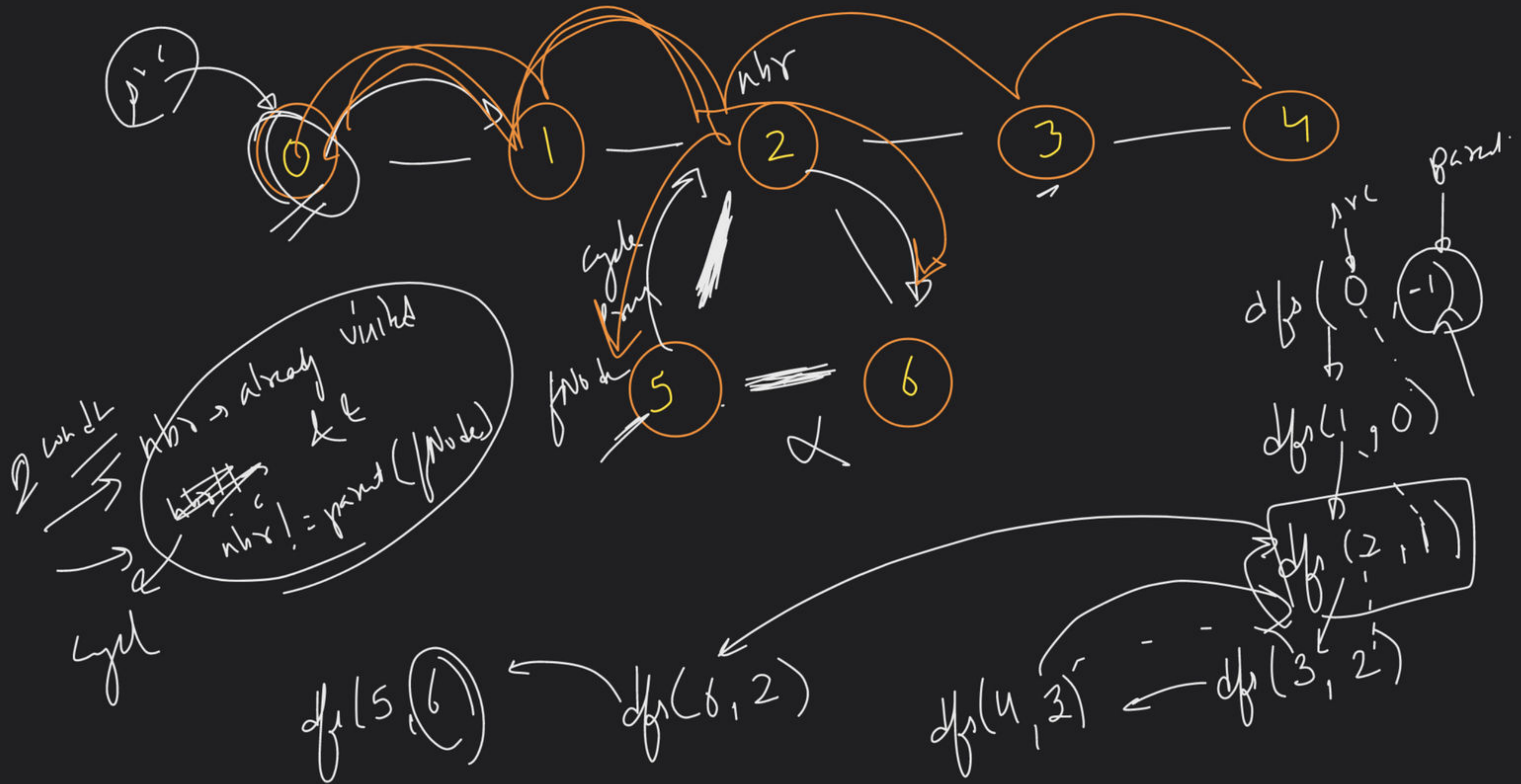
dfs(1)

dfs(2)

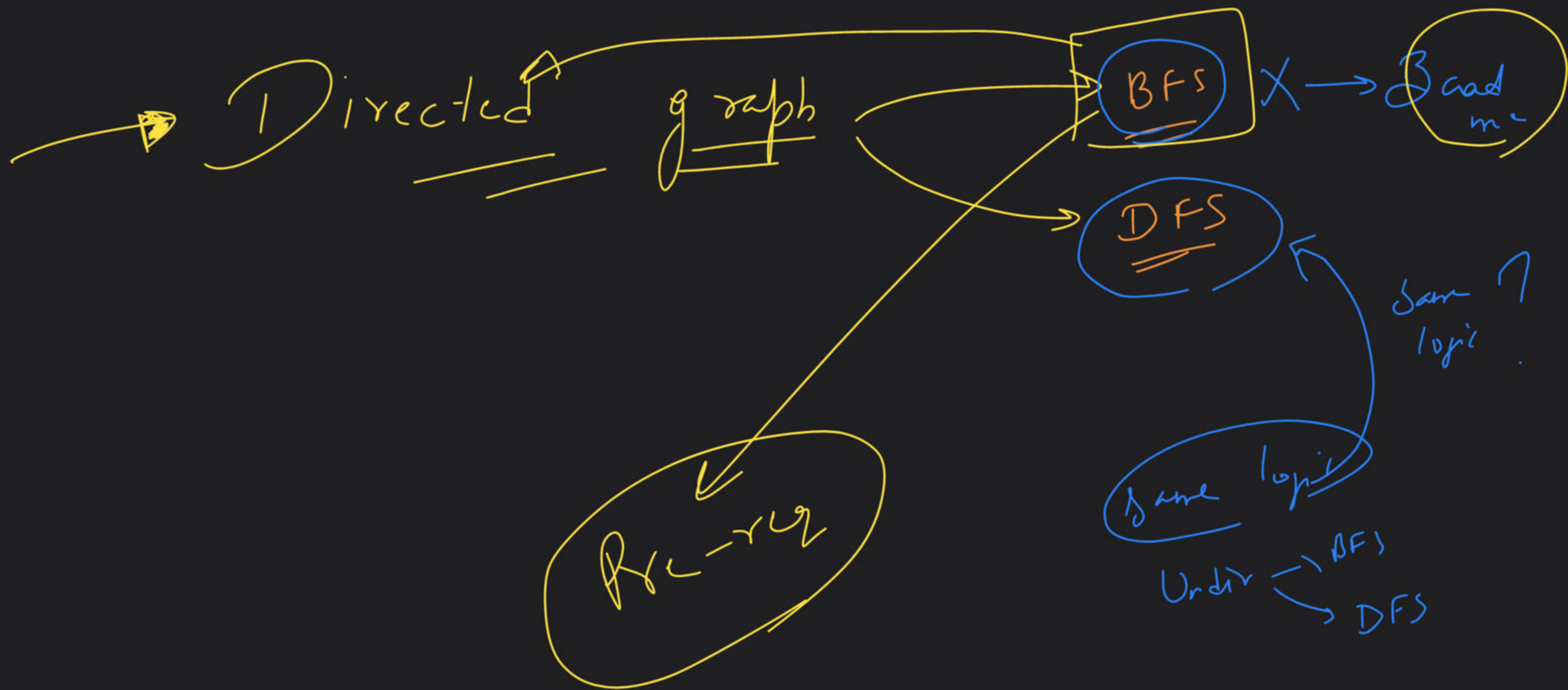
dfs(3)

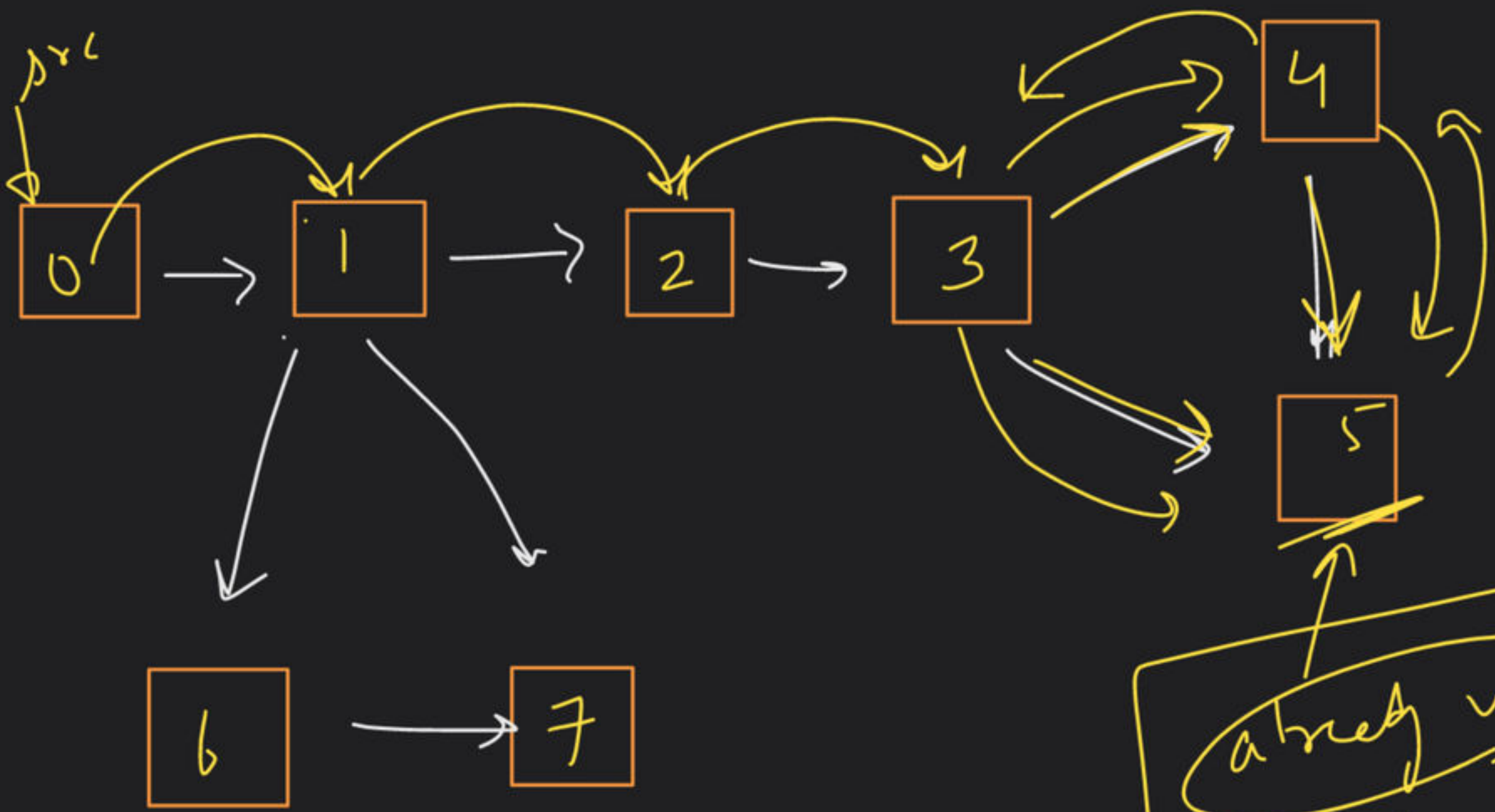
dfs(4)

dfs(2)



→ Undirected graph → Cycle detection





dfs(0, -1)
↓
dfs(1, 0)
↓
dfs(2, 1)

dfs(3, 2)

dfs(4, 3)

dfs(5, 4)

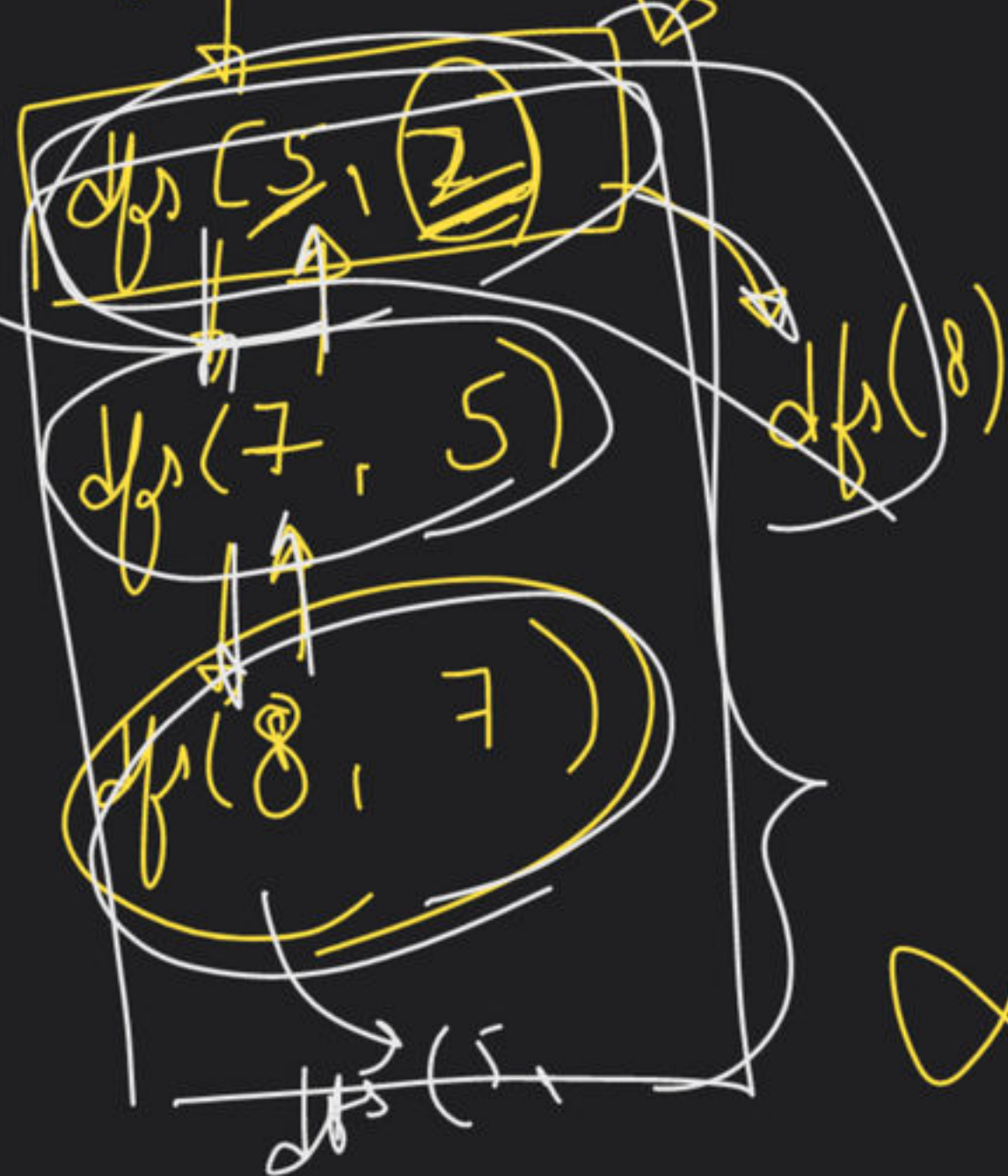
dfs(5, 1)

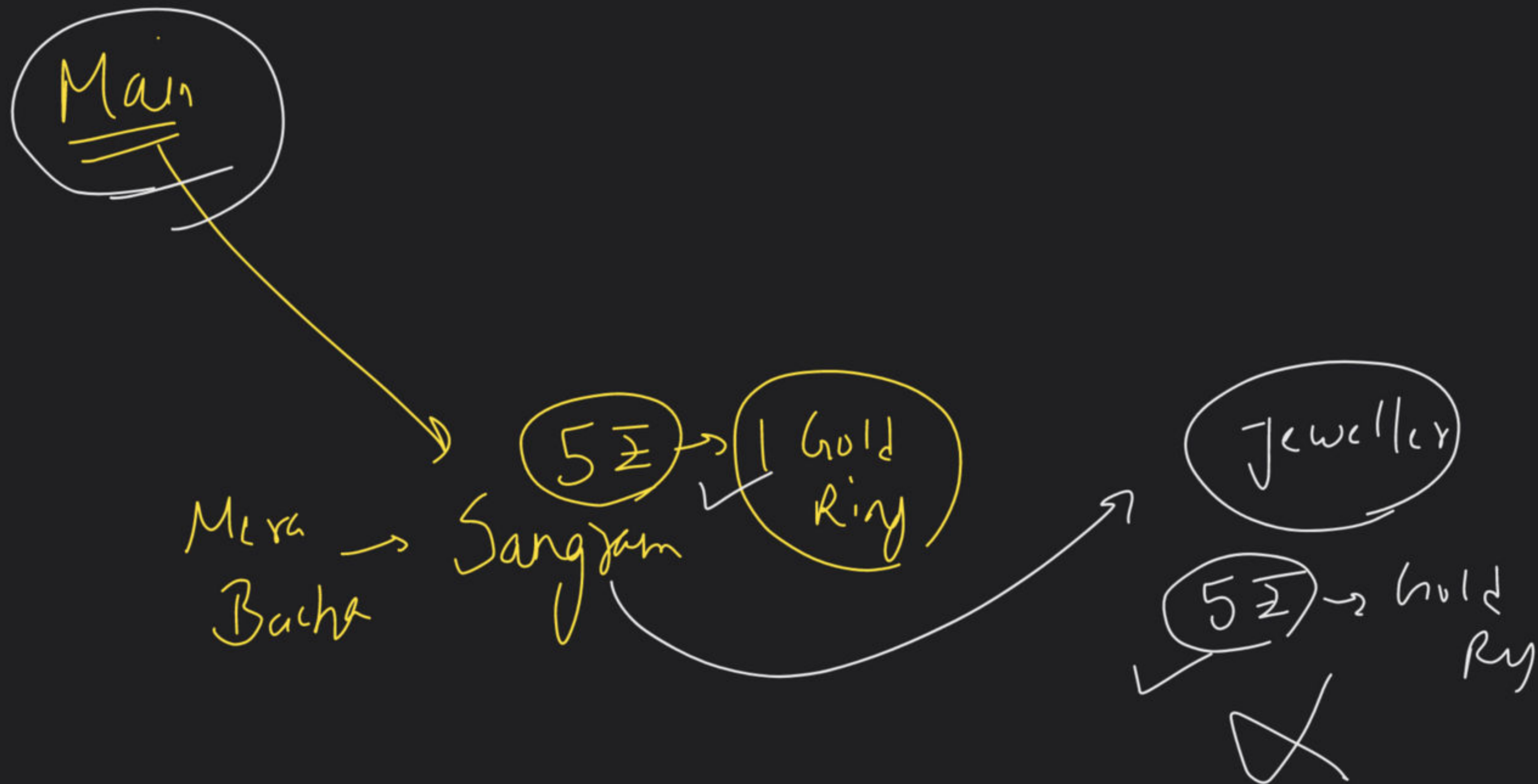
already visited
↓ 4
5 != parent(3)
5 != 2

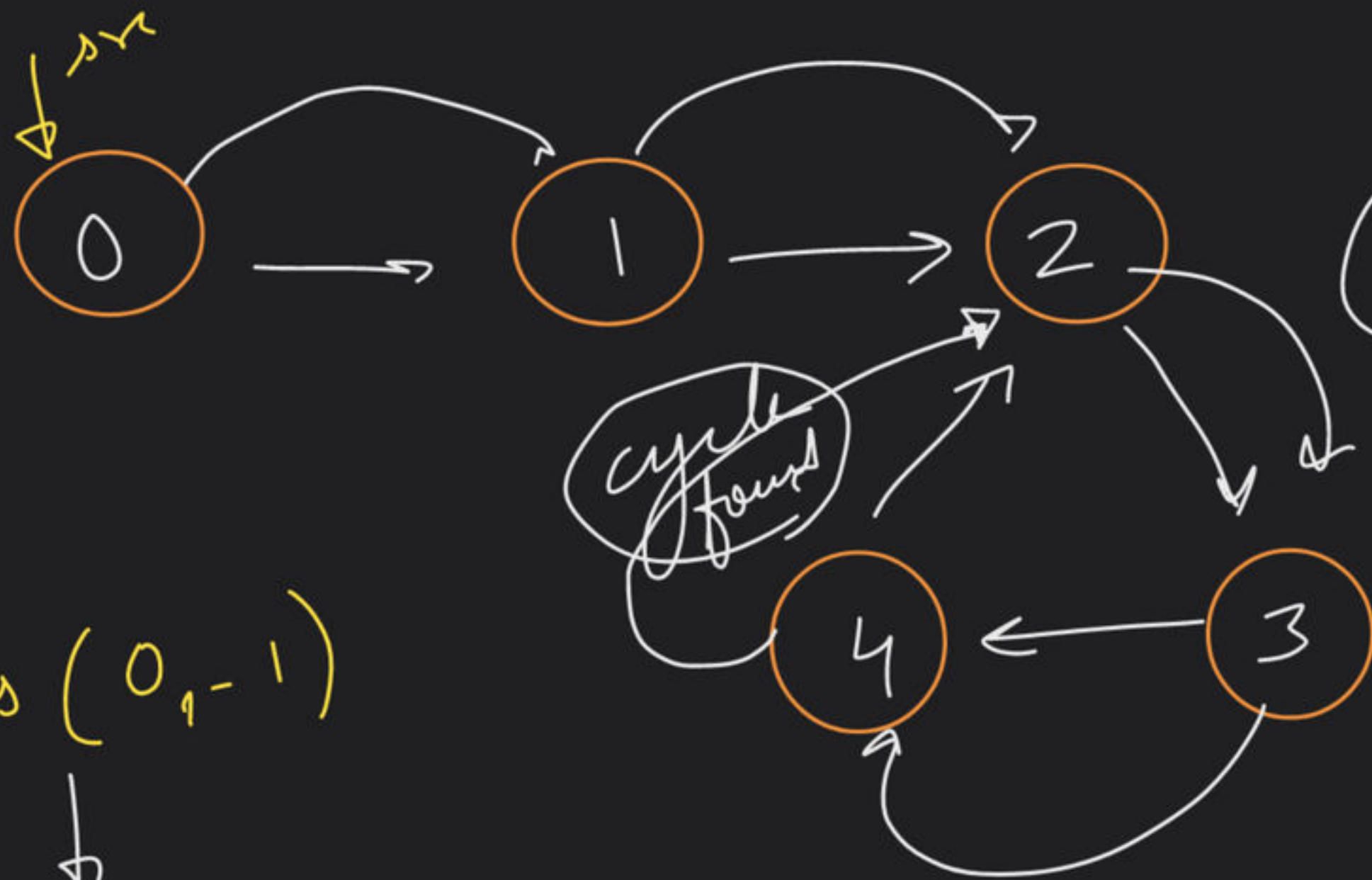
Logic failed

cycle print

dfs(4, -1)
 ↓
 dfs(3, 4)
 ↓
 dfs(2, 3)







node
vis → true
dfs vis → true

Adj List

| | |
|-------|-------|
| 0 → 1 | 2 → 3 |
| 1 → 2 | 3 → 4 |
| | 4 → 2 |

dfs(0, -1)

dfs(1, 0)

dfs(2, 1)

dfs(3, 2) → dfs(4, 3)

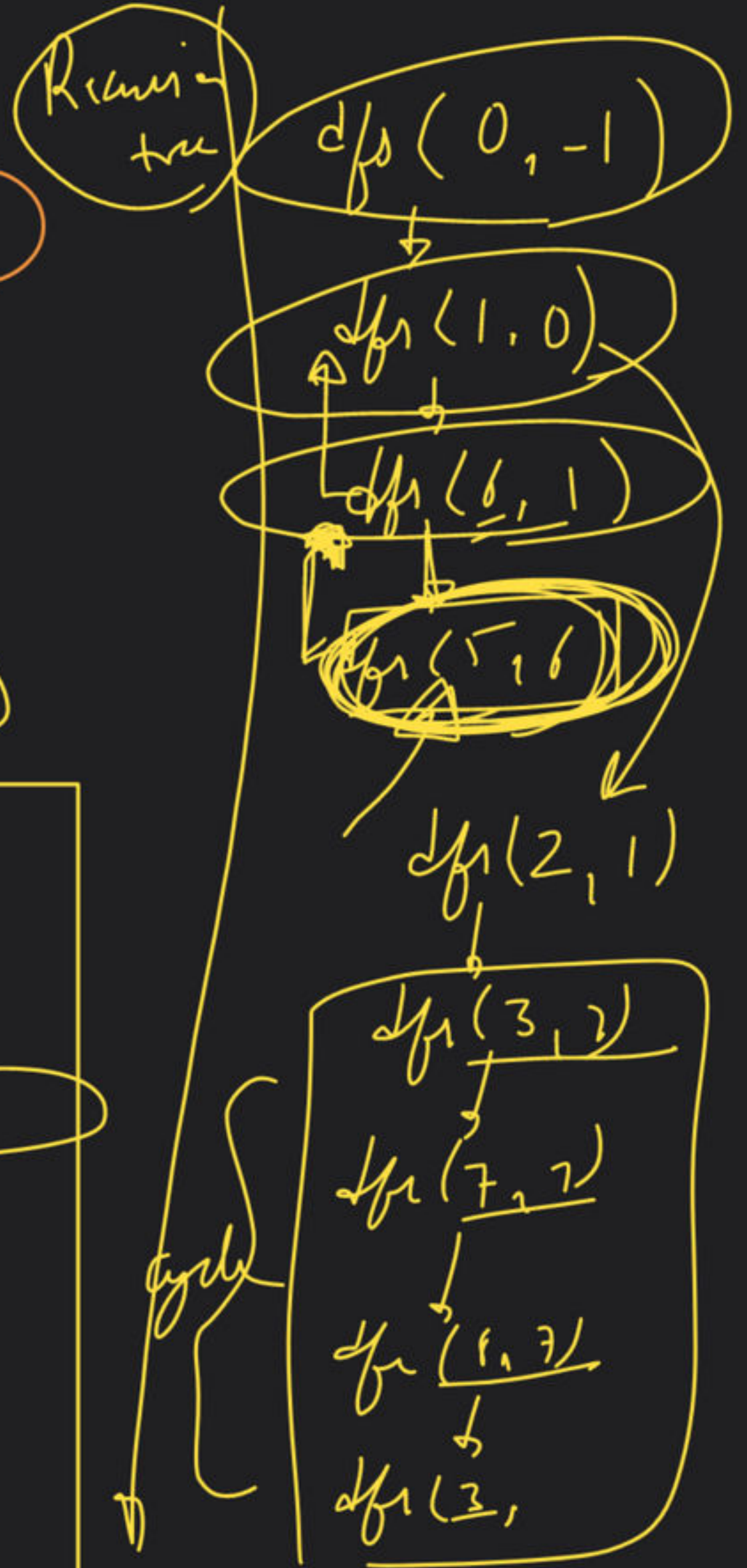
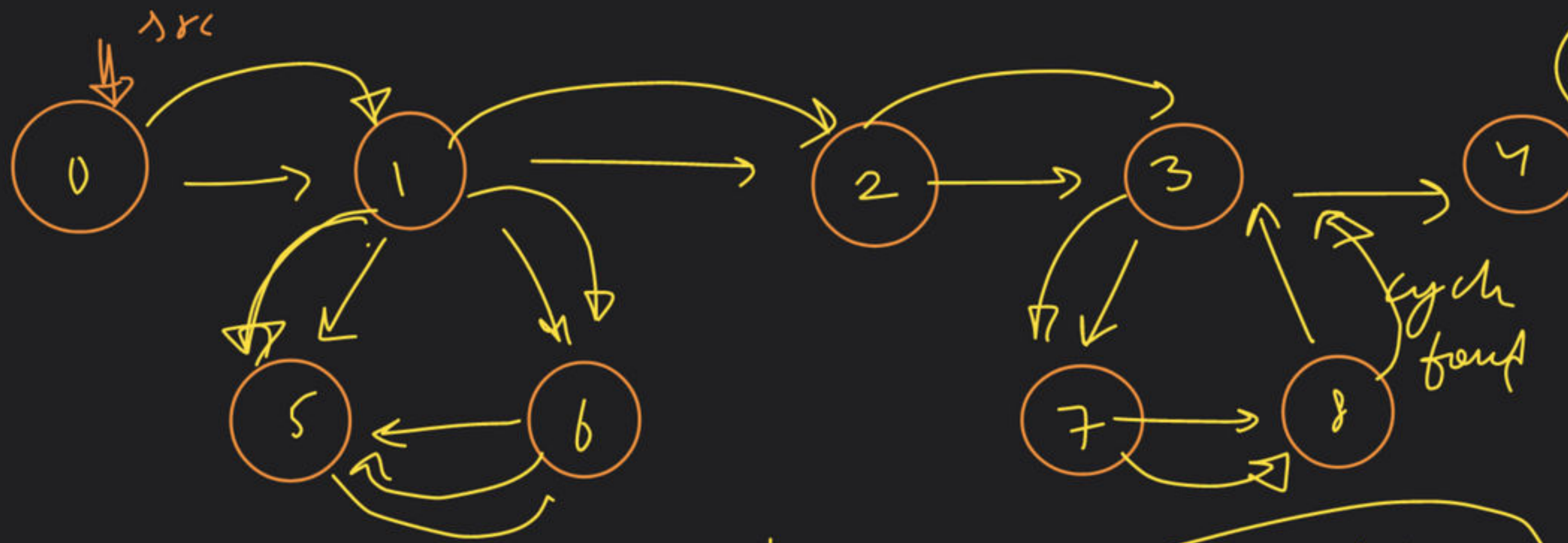
(A) → 0 → 0 → 0 → (A)

Visited

| | |
|-----------------------|--------------------|
| 0 → F True | 2 → F T |
| 1 → F True | 3 → F T |
| | 4 → F T |

Dfs Visited

| | |
|-----------------------|-----------------------|
| 0 → F True | 2 → F True |
| 1 → F True | 3 → F True |
| | 4 → F True |



Adj List

```

0 → 1
1 → 5, 6, 2
2 → 3
3 → 7, 4
4 → {}
5 → {3}
6 → 5
7 → 8
8 → 3
  
```

Visited

```

0 → F T
1 → F T
2 → F T
3 → F T
4 → F
5 → F T
6 → F T
7 → F T
8 → F T
  
```

Dfs Visited

```

0 → F T
1 → F T
2 → F T
3 → F T
4 → F
5 → F T F
6 → F T F
7 → F T
8 → F T
  
```