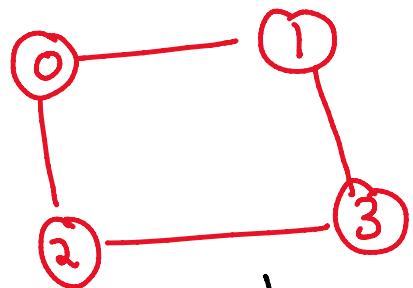


Detect cycle in undirected graph

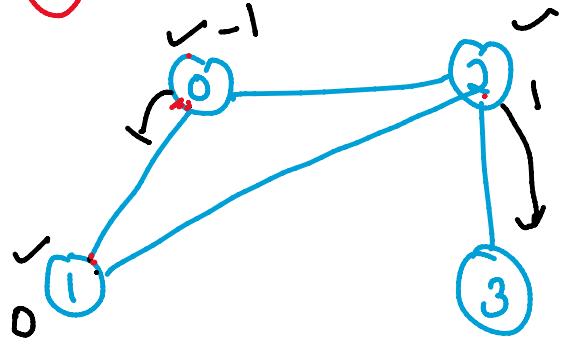
29 October 2022 13:04



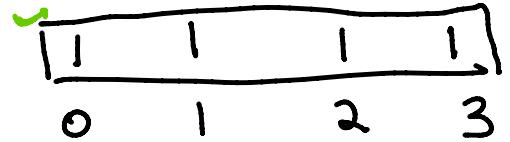
false

true

BFS
DFS



visited array



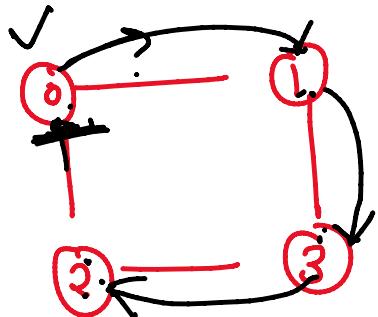
$0 \rightarrow 1, 2$

$1 \rightarrow 2, 0$

$2 \rightarrow 0, 1, 3$

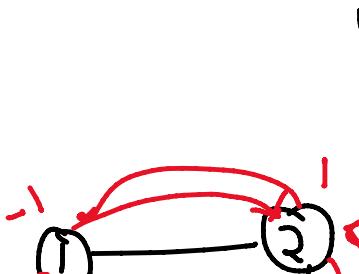
$3 \rightarrow 2$

parent?

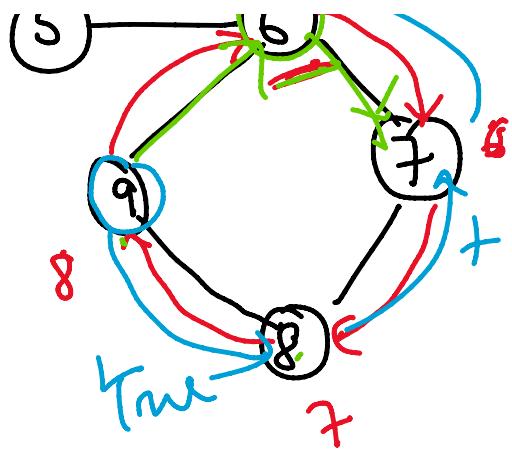
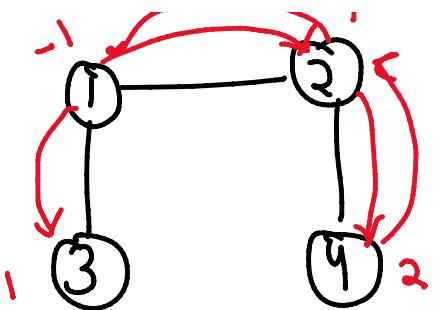


cycle

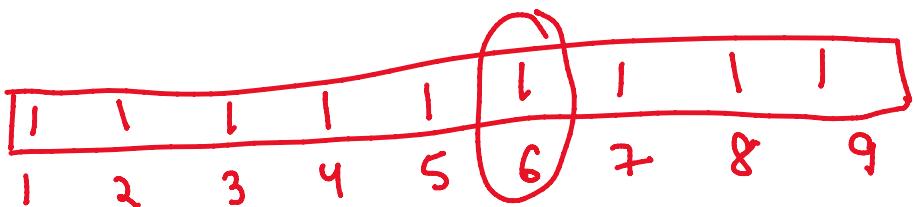
parent



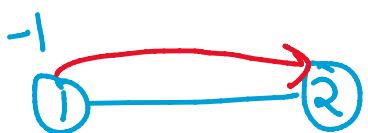
$1 \rightarrow 2, 3$
 $2 \rightarrow 1, 4$



- 1 → 4, 5
- 2 → 1, 4
- 3 → 1
- 4 → 2
- 5 → 6
- 6 → 7, 9, 5
- 7 → 6, 8
- 8 → 7, 9
- 9 → 6, 8



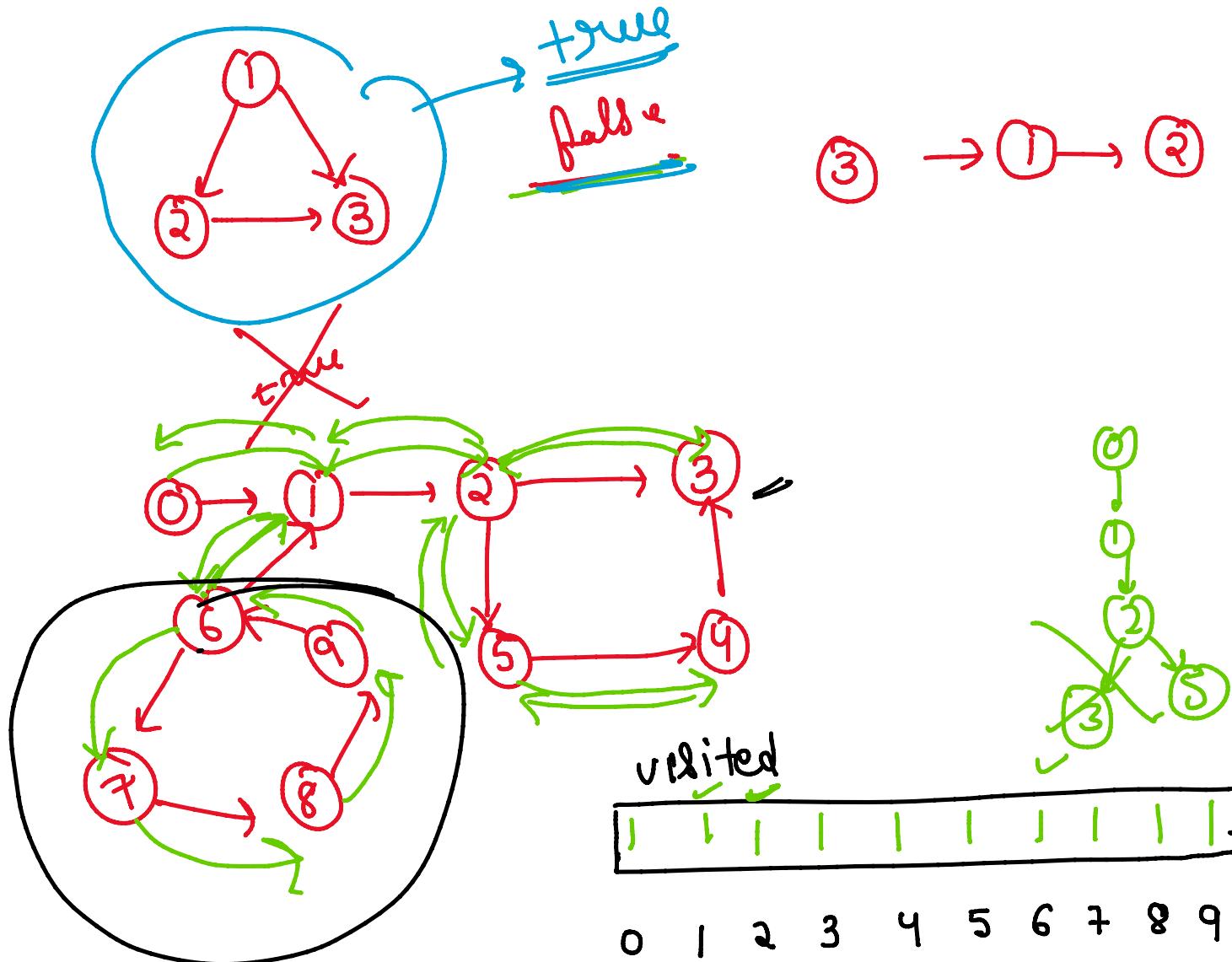
Time + V + E
spur v



A hand-drawn diagram illustrating a node structure. It features two ovals. The left oval contains the letter 'a' and is labeled 'nbr' below it. Above the left oval is a circled '1,' and above the right oval is a circled '-'. A curved arrow points from the top of the left oval to the top of the right oval. The right oval contains the word 'node' with a horizontal line underneath it. An arrow points from the right side of the 'node' oval to the word 'parent' written in red.

Detect cycle in directed graph

29 October 2022 13:41



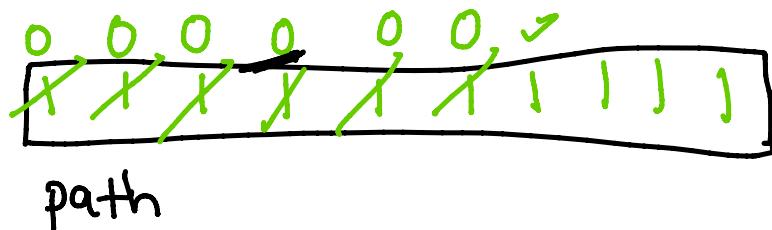
Time + $O(V+E)$

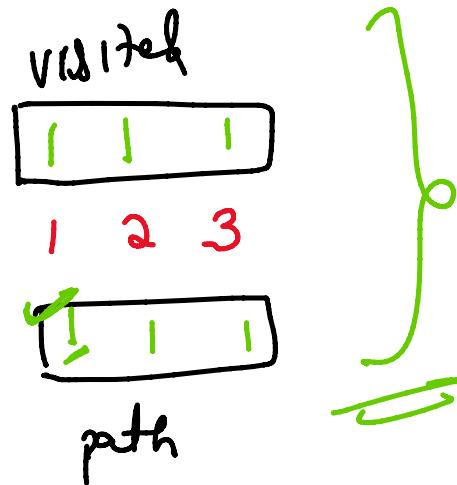
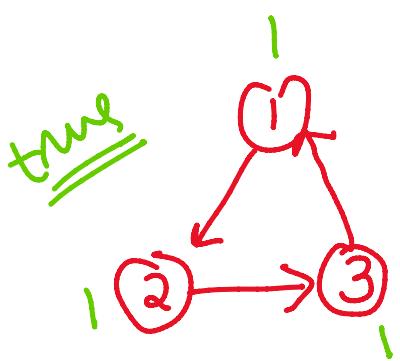
Space + $O(V)$

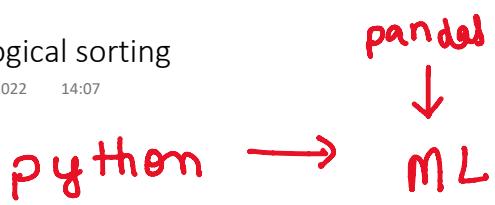
$V \rightarrow V$ visited

$V \rightarrow$ path

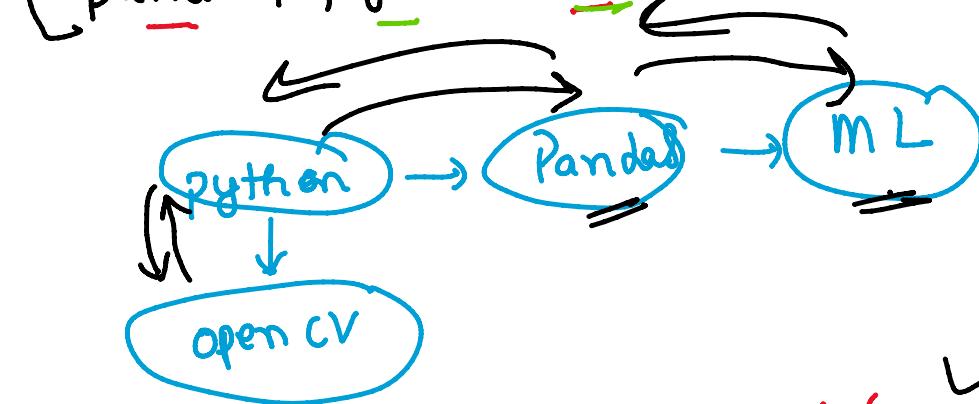
$V \rightarrow$ tree



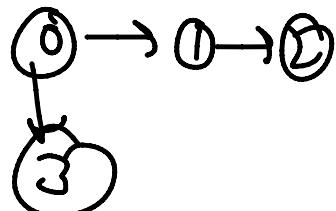


 $x \rightarrow y$

{ python, pandas, ML
pandas, python, ML

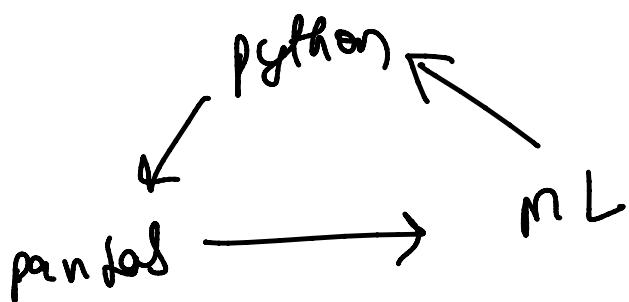
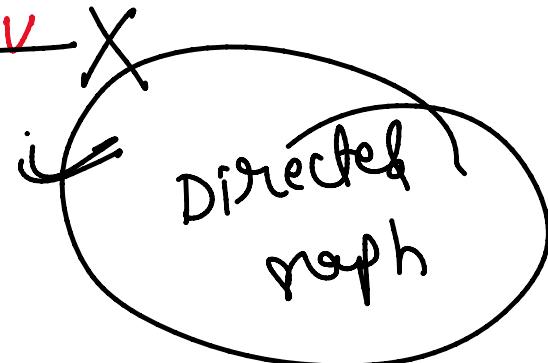


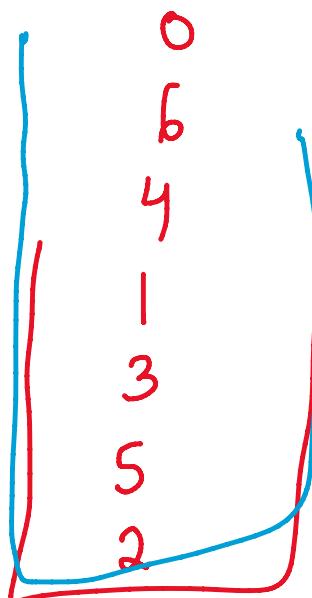
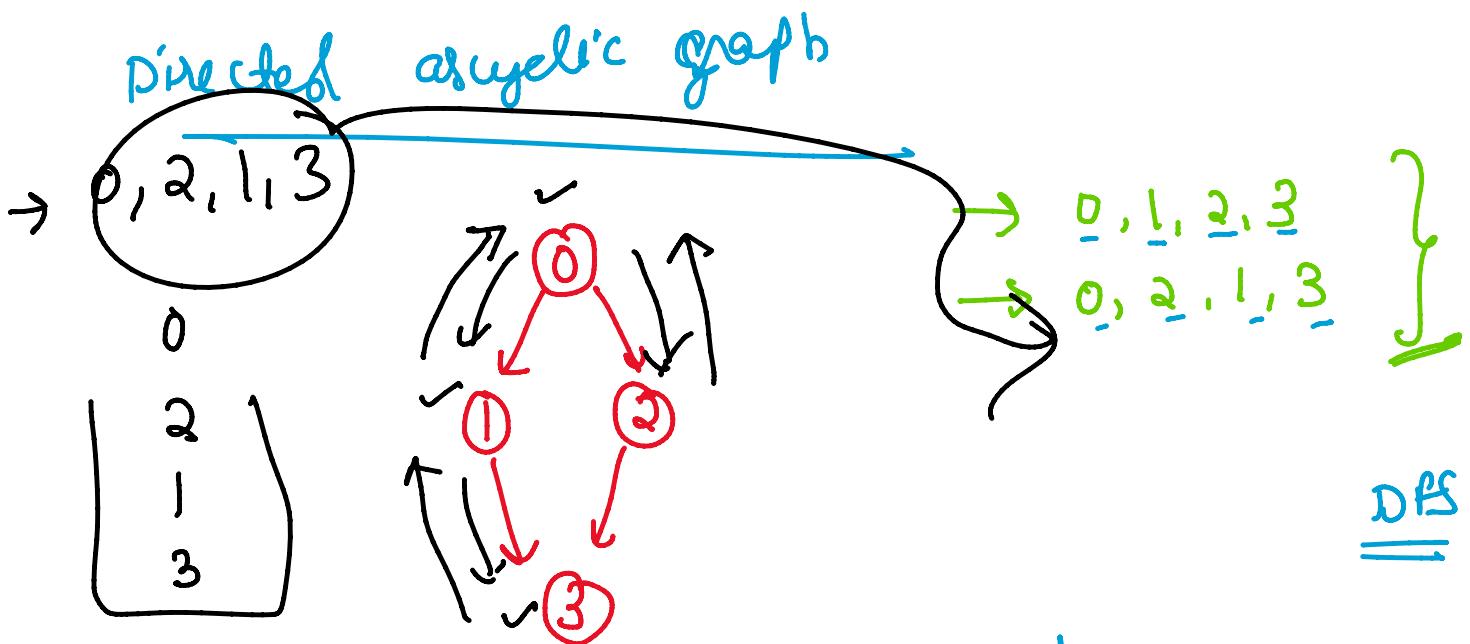
python
pandas,
ML
openCV



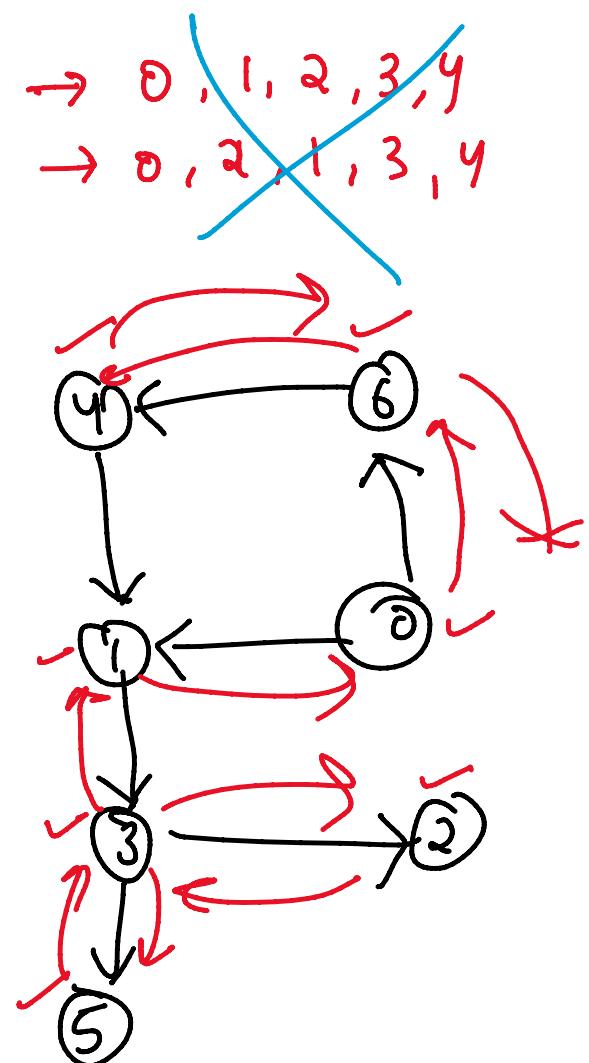
→ python, openCV, pandas, ML
→ python, pandas, openCV, ML
→ python, pandas, ML, openCV ?
→ python, ML, ~~pandas, openCV~~ X

python — pandas

DAG



$0, \underline{6}, \underline{4}, \underline{1}, \underline{3}, \underline{5}, \underline{2}$



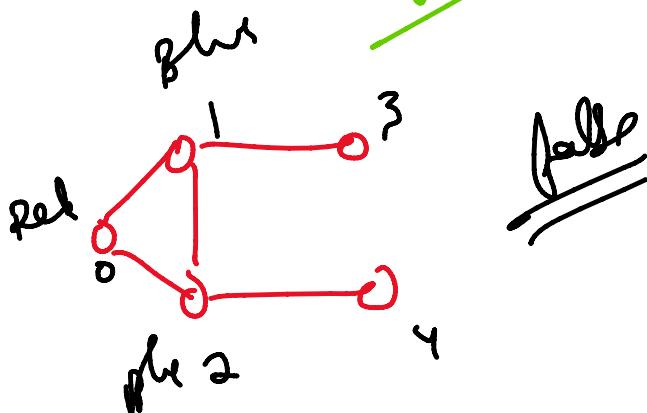
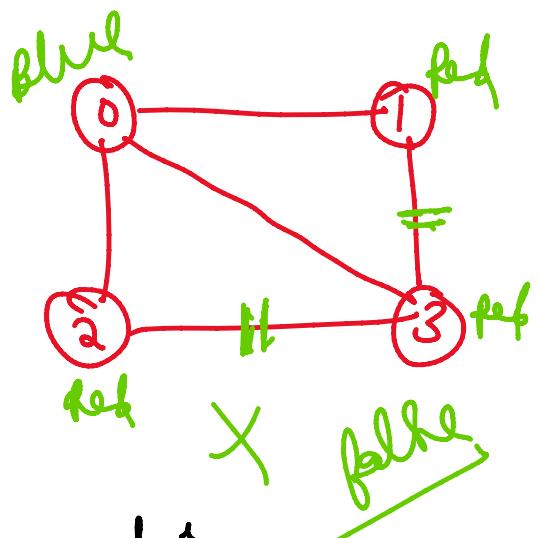
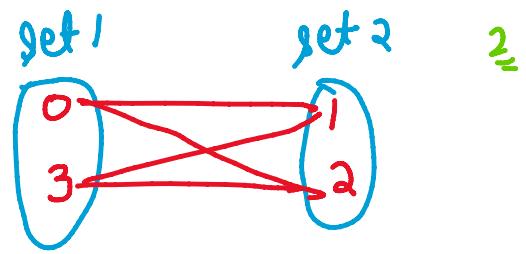
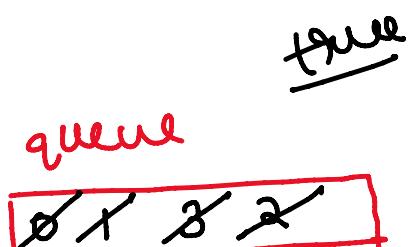
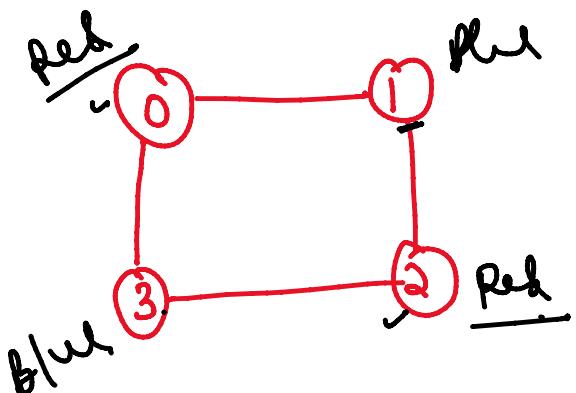
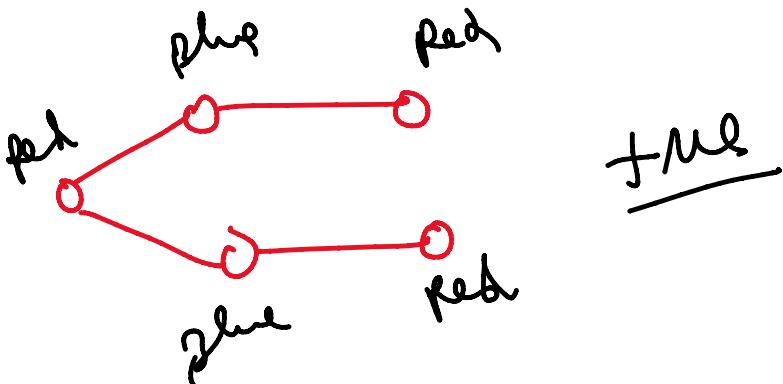
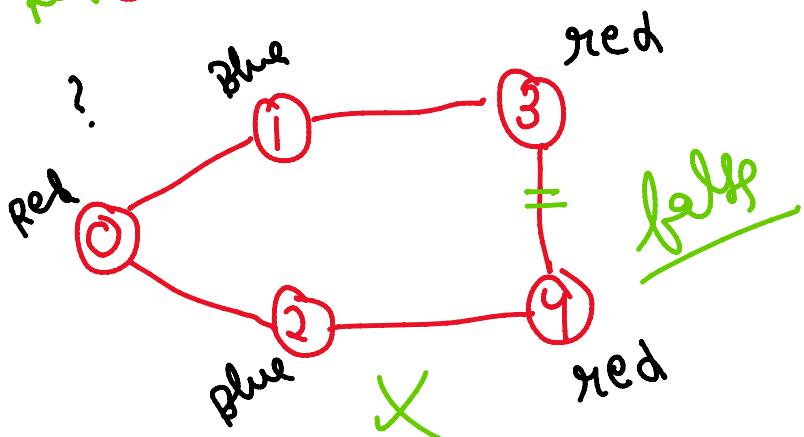
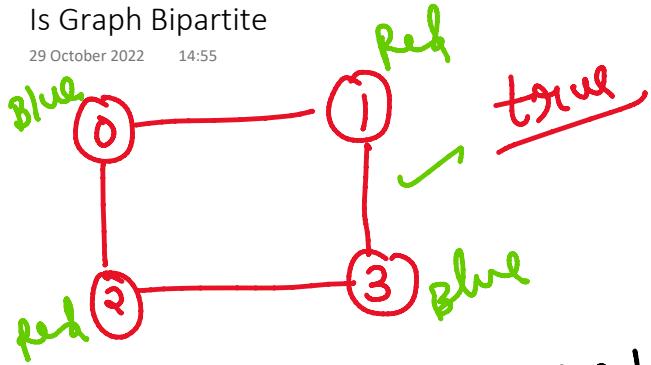
metcode

Course - schedule 1
Course - schedule 2

Course -> -----
course - schedule 2

Is Graph Bipartite

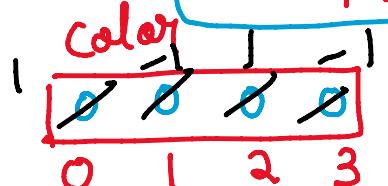
29 October 2022 14:55



$1 \rightarrow \text{Red} -$
 $-1 \rightarrow \text{Blue} -$
 $0 \rightarrow \text{unvisited}$

DFS
BFS

| |
|----------------------|
| $0 \rightarrow 1, 3$ |
| $1 \rightarrow 0, 2$ |
| $2 \rightarrow 1, 3$ |
| $3 \rightarrow 0, 2$ |

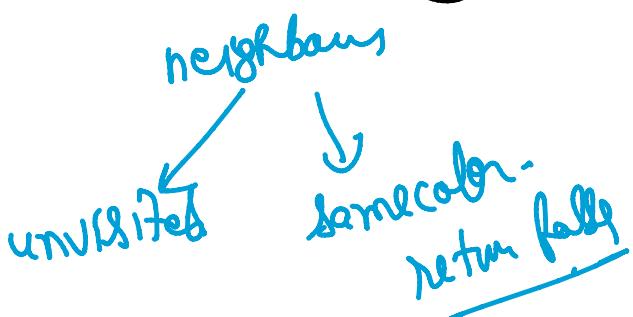
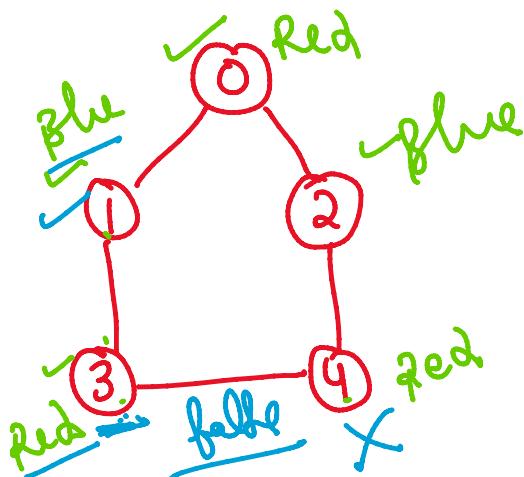


| | | | | | |
|---|---|---|---|---|---|
| v | 0 | 1 | 2 | 3 | 2 |
|---|---|---|---|---|---|

| | | | |
|---|---|---|---|
| 0 | 1 | 2 | 3 |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
|---|---|---|---|

0 1 2 3 2



$0 \rightarrow 1, 2$
 $1 \rightarrow 0, 3$
 $2 \rightarrow 0, 4$
 $3 \rightarrow 1, 4$
 $4 \rightarrow 2, 3$

queue

| | | | | | |
|---|---|---|---|---|---|
| v | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|

0 1 2 3

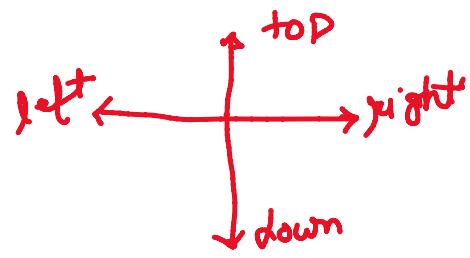
| | | | | |
|-----------|---|---|---|---|
| color(-1) | 1 | 1 | | |
| 0 | 1 | 2 | 3 | 4 |

$1 \rightarrow \text{Red}$
 $-1 \Rightarrow \text{Blue}$
 $0 \rightarrow \text{unvisited}$

Rotting oranges

29 October 2022 15:31

| 0,0 | | | |
|-----|-----|-----|-----|
| | 2 | 1/2 | 1/2 |
| | 1/2 | 1/2 | |
| | 1/2 | 1/2 | 1/2 |



$0 \rightarrow$ empty
 $1 \rightarrow$ fresh
 $2 \rightarrow$ rotten

1 2 3 4

| | | | |
|---|---|---|--|
| 2 | 1 | 1 | |
| 0 | 2 | 1 | |
| 1 | 0 | 1 | |

| | | | |
|-----|-----|-----|-----|
| 0 | 1/2 | 0 | 0 |
| 1/2 | 2 | 1/2 | 0 |
| 1/2 | 0 | 2 | 1/2 |
| 1/2 | 0 | 0 | 1/2 |

BFS

3

0,1,2

queue, visited
fresh = 7

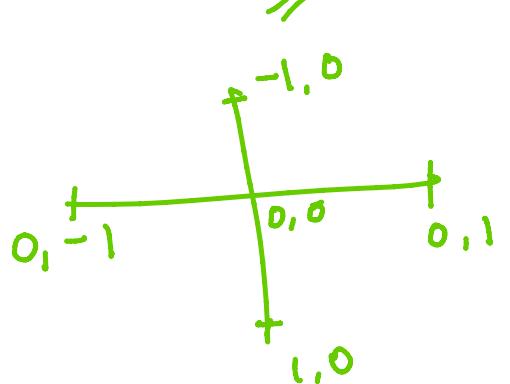
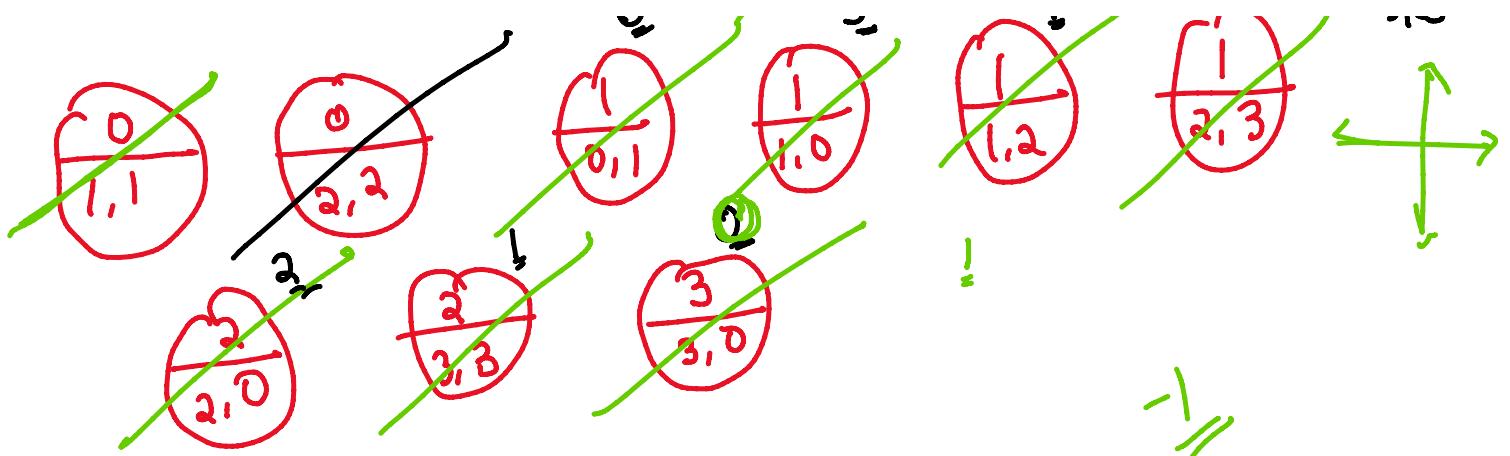
1, 2, 3

BFS

node
queue \rightarrow row, col, time

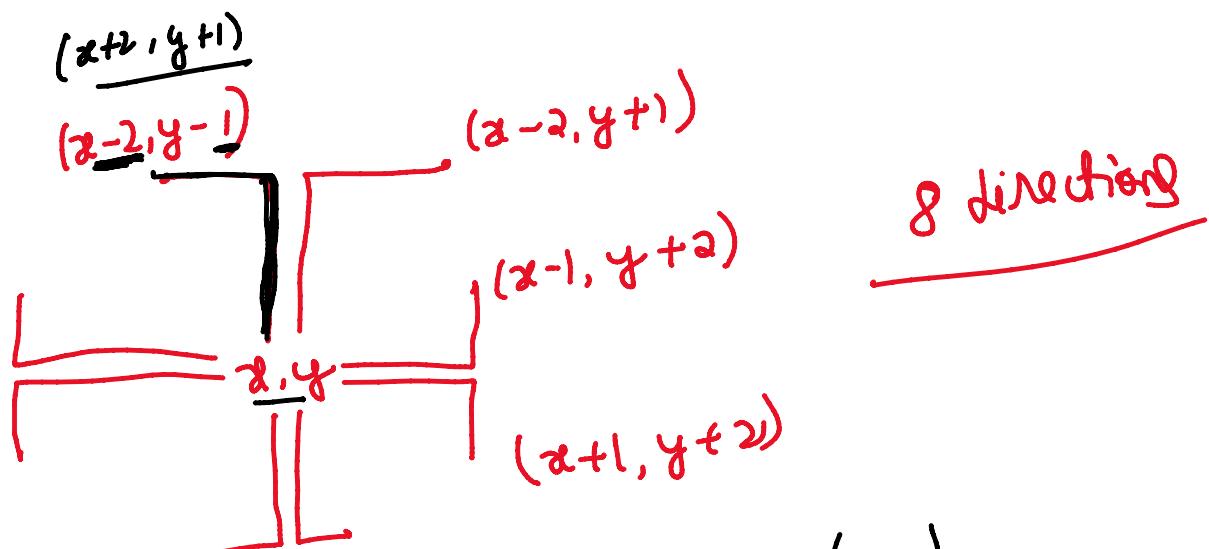
| | | | |
|-----|-----|-----|-----|
| 0 | 1/2 | 0 | 0 |
| 1/2 | 3 | 1/2 | 0 |
| 1/2 | 0 | 3 | 1/2 |
| 1/2 | 0 | 0 | 1/2 |





Steps by knights

29 October 2022 16:01



0
1
2
3
4

✓ Word search

✓ flood fill

0 | matrix

✓ Surrounding regions

Snake and ladder
Clone graph
Dijkstra