

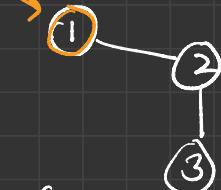

Cycle Detection

→ Cycle detection in Undirected graph

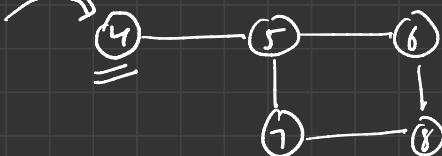
BFS

$u \rightarrow v$
 $u \rightarrow v$
 $v \rightarrow u$

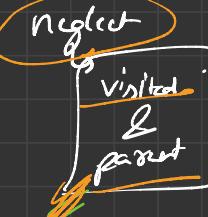
G



c_1

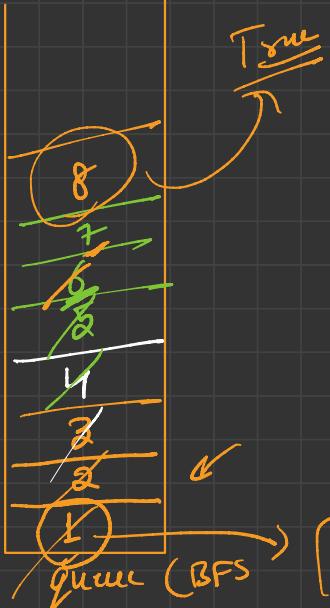


c_2



Adj

$\begin{matrix} 1 & \rightarrow & 2 \\ 2 & \rightarrow & 1, 3 \\ 3 & \rightarrow & 2 \\ 4 & \rightarrow & 5 \\ 5 & \rightarrow & 4, 6, 7 \\ 6 & \rightarrow & 5, 8 \\ 7 & \rightarrow & 5, 8 \\ 8 & \rightarrow & 6, 7, 9 \\ 9 & \rightarrow & 8 \end{matrix}$



$src = 1$

$src = 4$

parent

$\begin{matrix} n \rightarrow y \\ 1 \rightarrow - \\ 2 \rightarrow 1 \\ 3 \rightarrow 2 \\ 4 \rightarrow -1 \\ 5 \rightarrow 4 \\ 6 \rightarrow 5 \\ 7 \rightarrow 6 \\ 8 \rightarrow 6 \end{matrix}$

visited

1 → TRUE
2 → TRUE
3 → TRUE
4 → TRUE
5 → TRUE
6 → TRUE
7 → TRUE
8 → TRUE

$8 \rightarrow 6$

$front = 1$

$visited = \text{TRUE}$

$node 1 = parent$

Cycle
point

$T-C \rightarrow$ Linear

$T \rightarrow [S] \delta, \theta$

$u \rightarrow [S]$

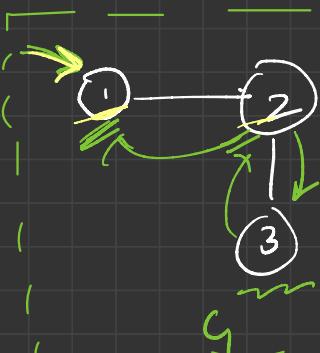
$S \rightarrow [\times] \underline{6,7}$

$\delta \rightarrow [\times] \underline{8}$

$\theta \rightarrow [\times] \underline{7,9}$

DFS

$1 \rightarrow [2]$
 $2 \rightarrow [\times] \underline{3,4}$



Graph

$3 \rightarrow [\times]$

$F(DFS(1, -1))$

$F(DFS(2, 1))$
 $F(DFS(3, 2))$

$T \rightarrow DFS(4, -1)$
 $T \rightarrow DFS(5, 4)$
 $T \rightarrow DFS(6, \underline{5})$

$T = \boxed{\text{visited}}$

$(1) \rightarrow \text{TRUE}$

$(2) \rightarrow \text{TRUE}$

$(3) \rightarrow \text{TRUE}$

$(4) \rightarrow \text{TRUE}$

$\Rightarrow (5) \rightarrow \text{TRUE}$

T.C \rightarrow Linear time

