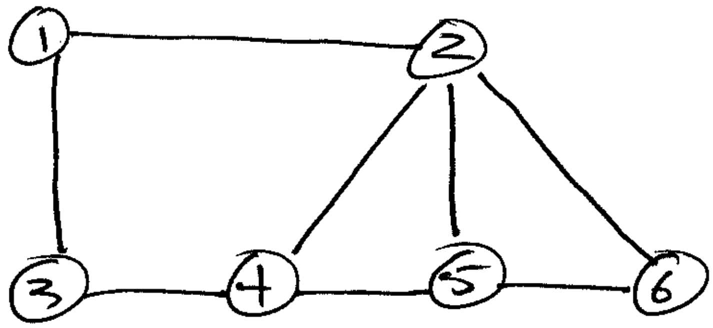
cse 101-02 4-18-23

Ex.

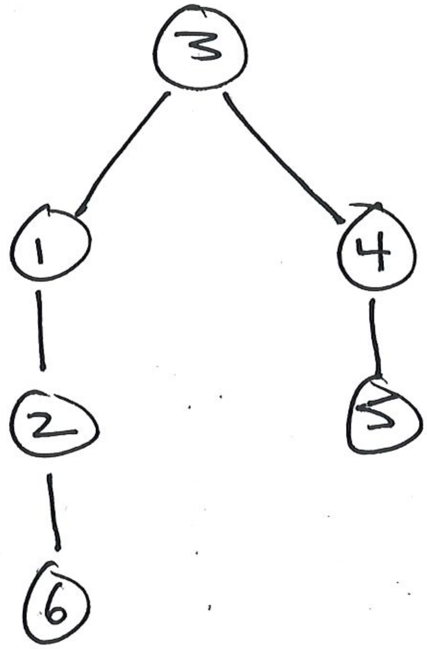


$\boxed{s = 3}$

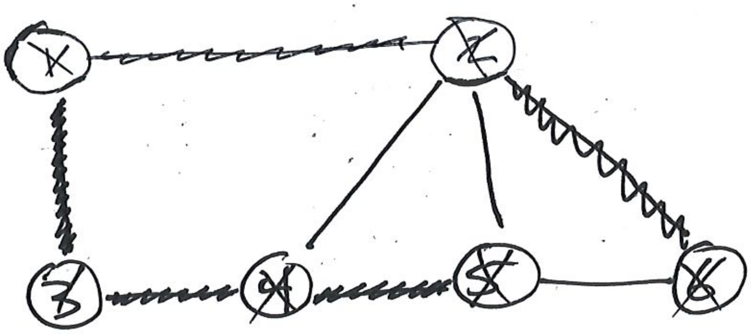
	adj	color	d	p
1	2 3	~~w~~ ~~g~~ b	~~∞~~ 1	~~n~~ 3
2	1 4 5 6	~~w~~ ~~g~~ b	~~∞~~ 2	~~n~~ 1
3	1 4	~~g~~ b	0	n
4	2 3 5	~~w~~ ~~g~~ b	~~∞~~ 1	~~n~~ 3
5	2 4 6	~~w~~ ~~g~~ b	~~∞~~ 2	~~n~~ 4
6	2 5	~~w~~ ~~g~~ b	~~∞~~ 3	~~n~~ 2

Q: $\cancel{3}$ $\cancel{1}$ $\cancel{4}$ $\cancel{2}$ $\cancel{5}$ $\cancel{6}$

BFS Tree!



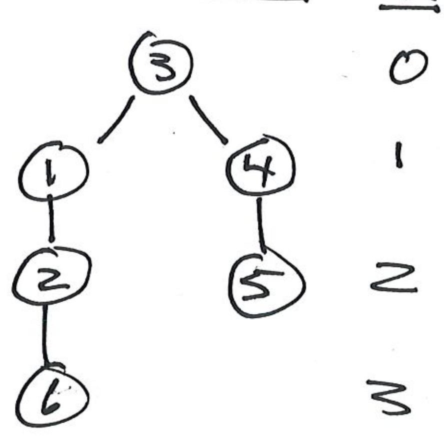
Short way:



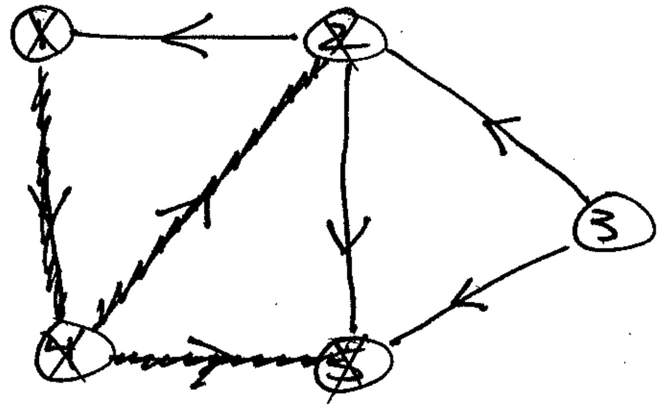
$\boxed{s = 3}$

Q: ~~3~~ ~~1~~ ~~4~~ ~~2~~ ~~5~~ 6

Tree   d



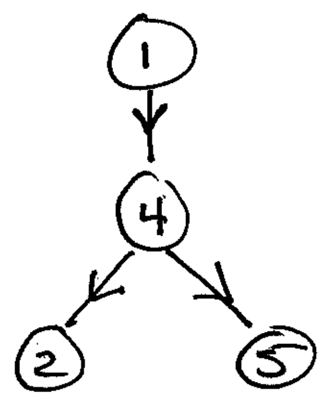
Ex.



$\boxed{s=1}$

Q: $\cancel{1}$ $\cancel{4}$ $\cancel{2}$ $\cancel{5}$

BFS Tree:



dist
0
1
2

	adj	col.	d	p
1	4	b	0	n
2	1 5	b	2	4
3	2 5	w	∞	n
4	2 5	b	1	1
5		b	2	4

Predecessor Subgraph

$$T = (V_p, E_p)$$

$$V_p = \{ x \in V(G) \mid p[x] \neq nil \} \cup \{s\}$$

$$E_p = \{ (p[x], x) \mid p[x] \neq nil \}$$

ordered pair iff digraph
unordered pair iff graph

Pseudo-code: PrintPath(G, s, x)

Depth First Search (DFS)

Vertex attributes: for $x \in V(G)$

- $color[x]$: w, g, b
- $p[x]$: predecessor of x
- $d[x]$: discover time
- $f[x]$: finish time.

Subroutine: Visit(x) recursive

time: $0 \leq time \leq 2n$

$n = |V(G)|$

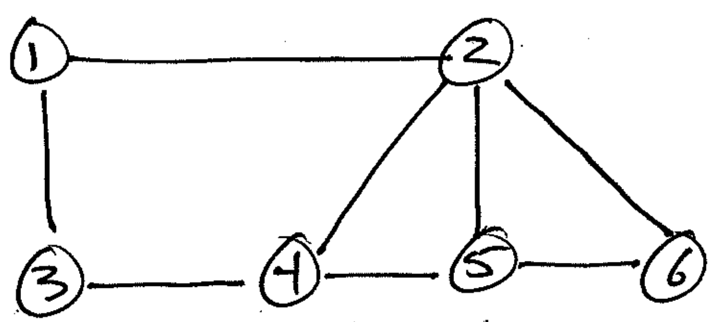
Predecessor Subgraph

$G = (V_p, E_p)$ ← DFS Forest

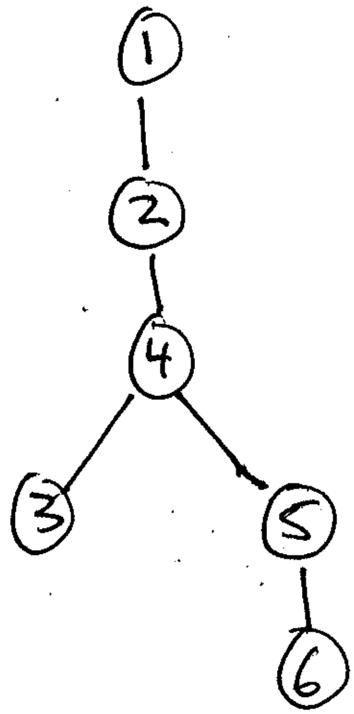
$V_p = V(G)$

$E_p = \{ (p[x], x) \mid p[x] \neq nil \}$

Ex



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



<u>time</u>

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