

Breadth First Search

BFS(G, s)

```
1  for each vertex  $u \in V[G] - \{s\}$ 
2      do  $color[u] \leftarrow \text{WHITE}$ 
3       $d[u] \leftarrow \infty$ 
4       $\pi[u] \leftarrow \text{NIL}$ 
5   $color[s] \leftarrow \text{GRAY}$ 
6   $d[s] \leftarrow 0$ 
7   $\pi[s] \leftarrow \text{NIL}$ 
8   $Q \leftarrow \emptyset$ 
9  ENQUEUE( $Q, s$ )
10 while  $Q \neq \emptyset$ 
11     do  $u \leftarrow \text{DEQUEUE}(Q)$ 
12     for each  $v \in Adj[u]$ 
13         do if  $color[v] = \text{WHITE}$ 
14             then  $color[v] \leftarrow \text{GRAY}$ 
15                  $d[v] \leftarrow d[u] + 1$ 
16                  $\pi[v] \leftarrow u$ 
17                 ENQUEUE( $Q, v$ )
18      $color[u] \leftarrow \text{BLACK}$ 
```

depth first search

DFS(G)

```
1  for each vertex  $u \in V[G]$ 
2      do  $color[u] \leftarrow \text{WHITE}$ 
3      do  $\pi[u] \leftarrow \text{NIL}$ 
4   $time \leftarrow 0$ 
5  for each vertex  $u \in V[G]$ 
6      do if  $color[u] = \text{WHITE}$ 
7          then  $\text{DFS-VISIT}(u)$ 
```

DFS – Visit(u)

```
1   $color[u] \leftarrow \text{GRAY}$            ▷ White vertex  $u$  has just been discovered.
2   $time \leftarrow time + 1$ 
3   $d[u] \leftarrow time$ 
4  for each  $v \in Adj[u]$            ▷ Explore edge  $(u, v)$ .
5      do if  $color[v] = \text{WHITE}$ 
6          then  $\pi[v] \leftarrow u$ 
7               $\text{DFS-VISIT}(v)$ 
8   $color[u] \leftarrow \text{BLACK}$        ▷ Blacken  $u$ ; it is finished.
9   $f[u] \leftarrow time \leftarrow time + 1$ 
```