Tutorial 13

Example 1

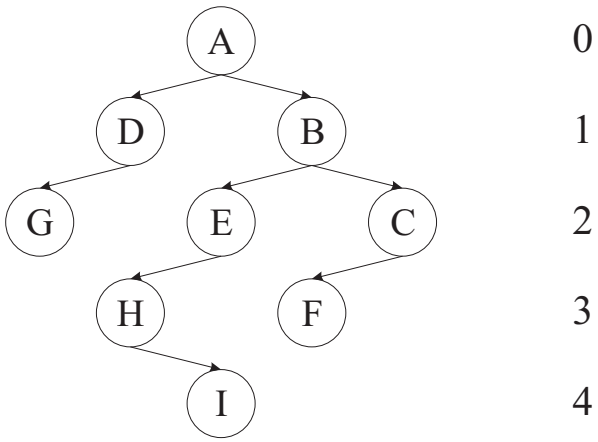

Figure 1: BFS spanning tree.

One of the possible sequences: A, B, D, C, E, G, F, H, I.

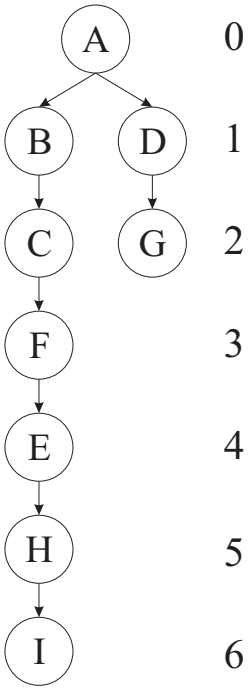

Figure 2: DFS spanning tree.

One of the possible sequences: A, B, C, F, E, H, I, D, G.

Example 2

- **reachable_nodes(g:DIGRAPH, v:VERTEX_TYPE):int** =
  $bfs(g, v)$
  $w := g.first\_vertex$
  $counter := 0$
  while $NOT\ g.nil\_vertex(w)$ **do**
    if $w.visited$ **then**
      $counter := counter + 1$
    end if
    $w := g.next\_vertex(w)$
  end while
  return $counter$

- **bfs(g:DIGRAPH, a:VERTEX_TYPE)** =
  $q : QUEUE$; $v, w : VERTEX\_TYPE$; $e : EDGE\_TYPE$
  $w := g.first\_vertex$
  while $NOT\ g.nil\_vertex(w)$ **do**
  $w.visited := false$
  $w := g.next\_vertex(w)$
  end while
  $a.distance := 0$
  $a.visited := true$
  $a.parent := new\_nil\_vertex$
  $q.make$
  $q.enqueue(a)$
  while $NOT\ q.empty$ **do**
  $v := q.dequeue$
  $e := g.first\_edge(v)$
  while $NOT\ g.nil\_edge(e)$ **do**
  $w := g.end\_point(e)$
  if $NOT\ w.visited$ **then**
  $visit(w)$
  $w.visited := true$
  $w.parent := v$
  $w.distance := v.distance + 1$
  $q.enqueue(w)$
  end if
  $e := g.next\_edge(v, e)$
  end while
  end while

Example 3

No solution here, for an example have a look at the slides.

Example 4

```
dfs(g:DIGRAPH, a:VERTEX_TYPE) =
s : STACK; v, w : VERTEX_TYPE; e : EDGE_TYPE
w := g.first_vertex
while NOT g.nil_vertex(w) do
   w.visited := false
   w := g.next_vertex(w)
end while
a.visited := true
a.parent := new_nil_vertex
s.make
s.push(a)
while NOT s.empty do
   v := s.pop
   e := g.first_edge(v)
   while NOT g.nil_edge(e) do
      w := g.end_point(e)
      if NOT w.visited then
         visit(w)
         w.visited := true
         w.parent := v
         s.push(w)
      end if
      e := g.next_edge(v, e)
   end while
end while
```