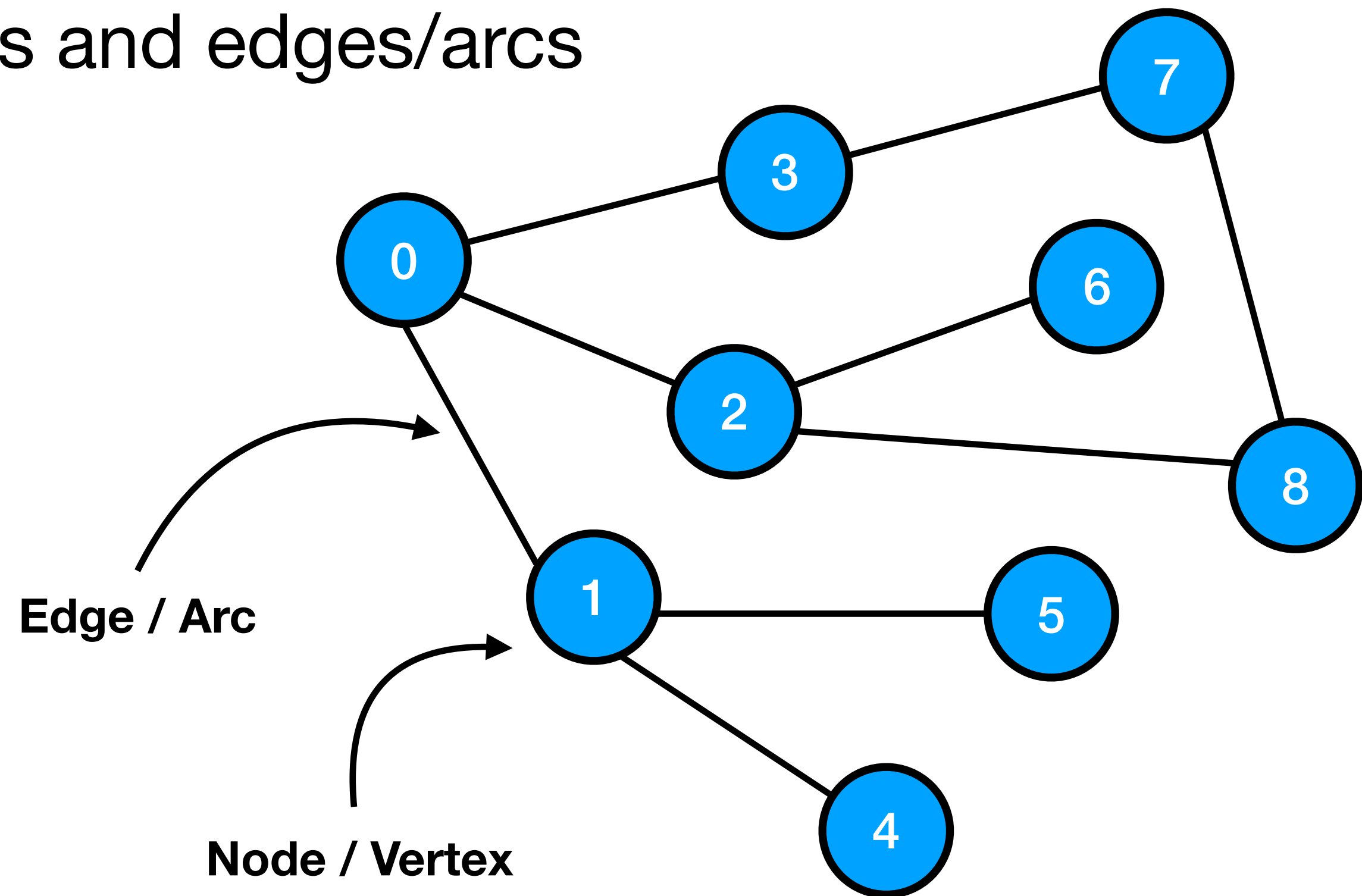


# Code Prime Theory

Graph Traversals

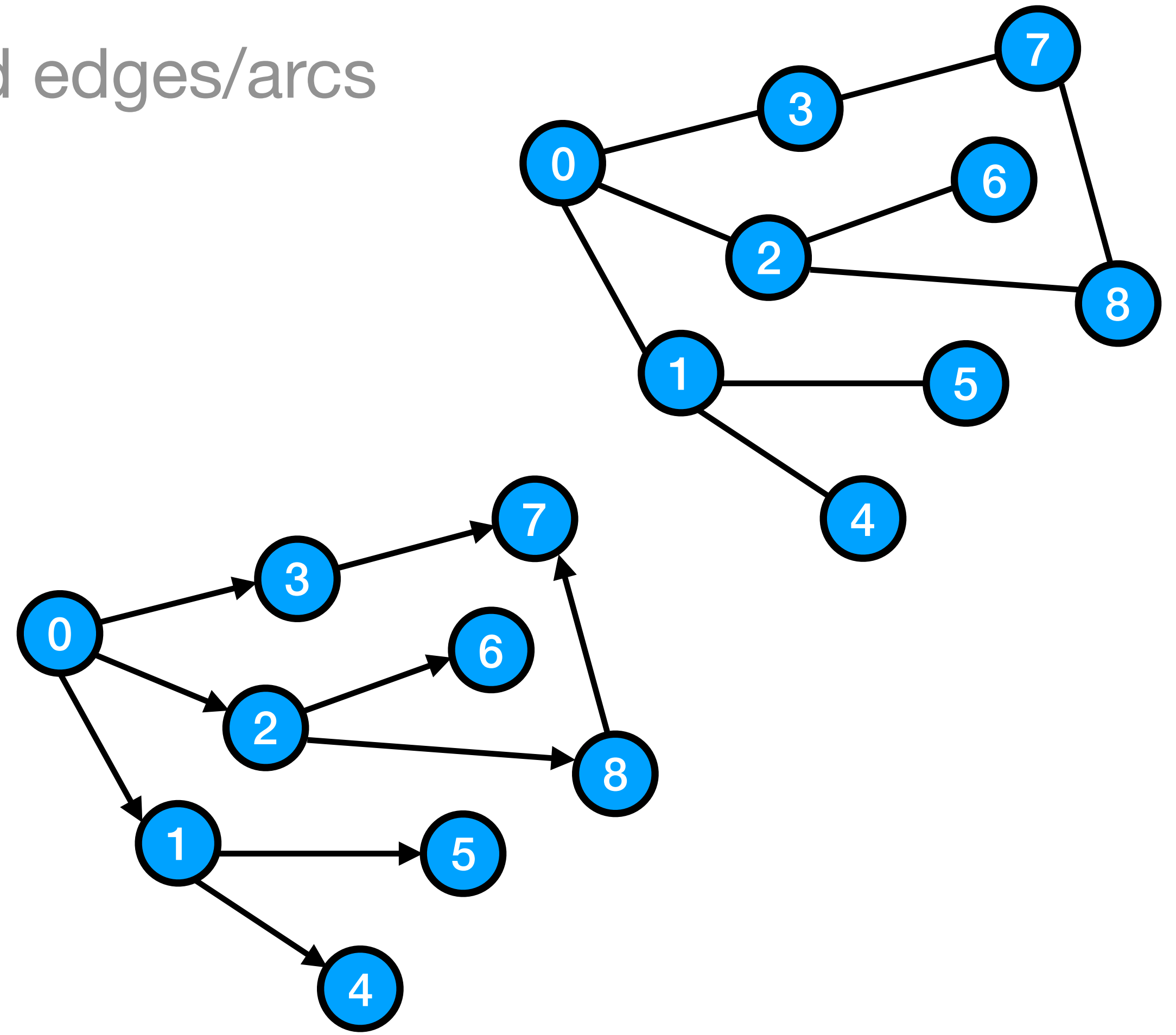
# Recap

- Graph consists of vertices/nodes and edges/arcs
- Undirected/Directed graph
- Weighted graph
- Graph representation



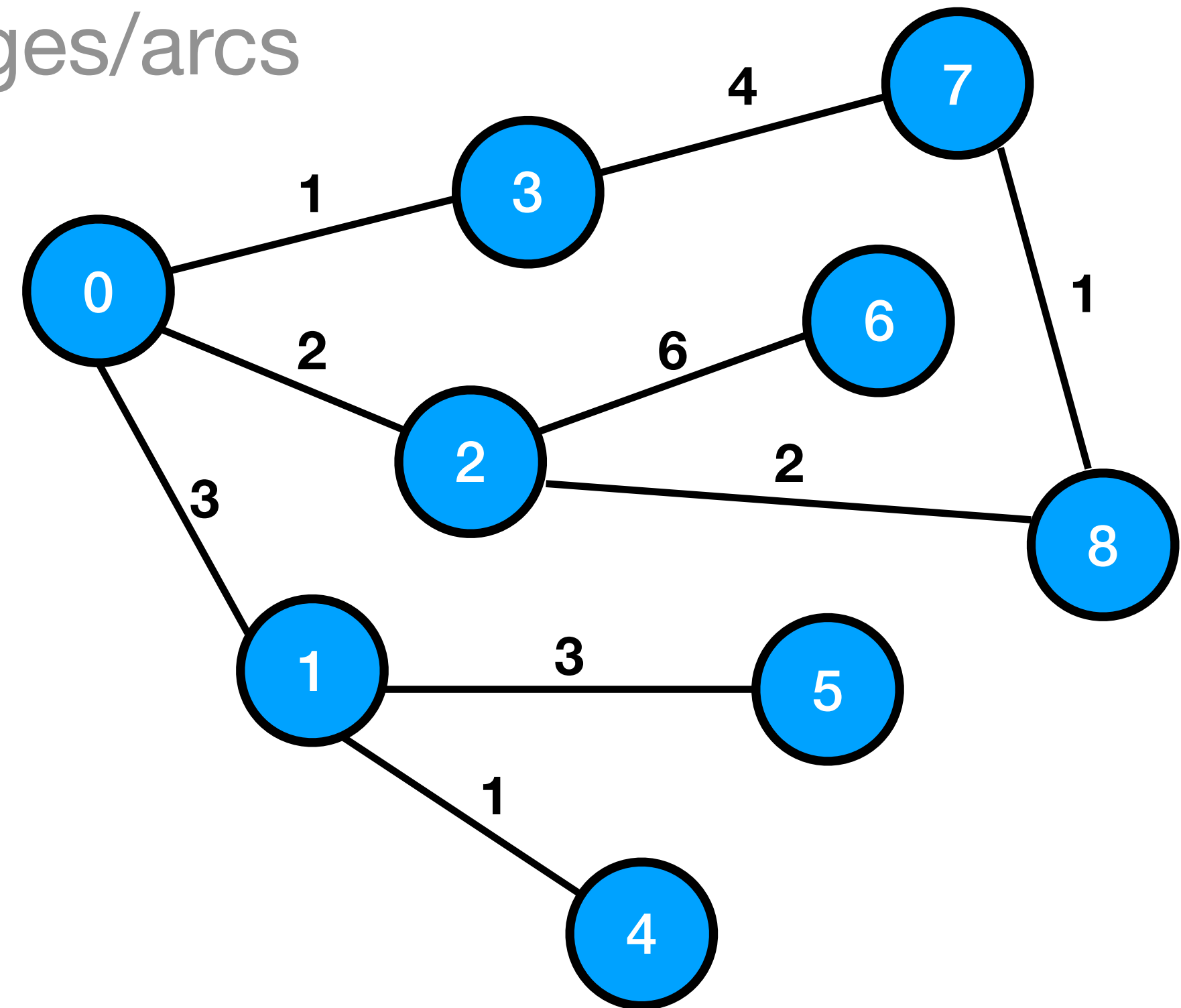
# Recap

- Graph consists of vertices/nodes and edges/arcs
- Undirected/Directed graph
- Weighted graph
- Graph representation



# Recap

- Graph consists of vertices/nodes and edges/arcs
- Undirected/Directed graph
- Weighted graph
- Graph representation

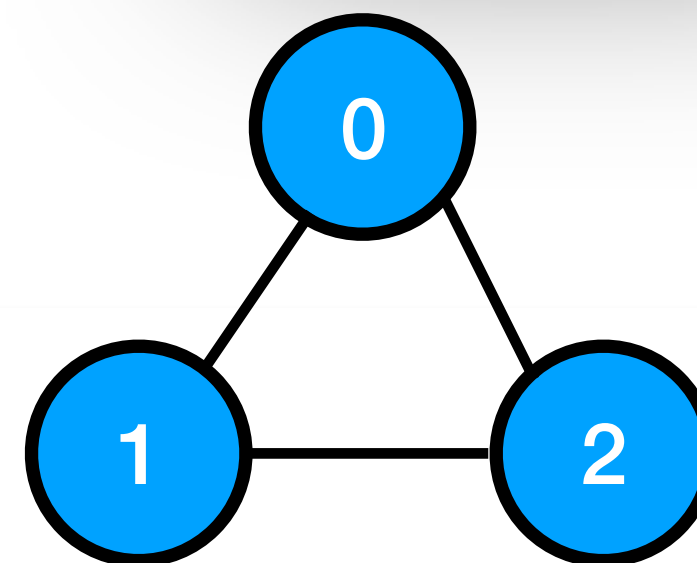


# Recap

- Graph consists of vertices/nodes and edges/arcs
- Undirected/Directed graph
- Weighted graph
- Graph representation

```
Edge list  
[  
  [0, 1],  
  [1, 2],  
  [2, 0]  
]
```

```
Adjacency matrix  
[  
  [0, 1, 1],  
  [1, 0, 1],  
  [1, 1, 0],  
]
```



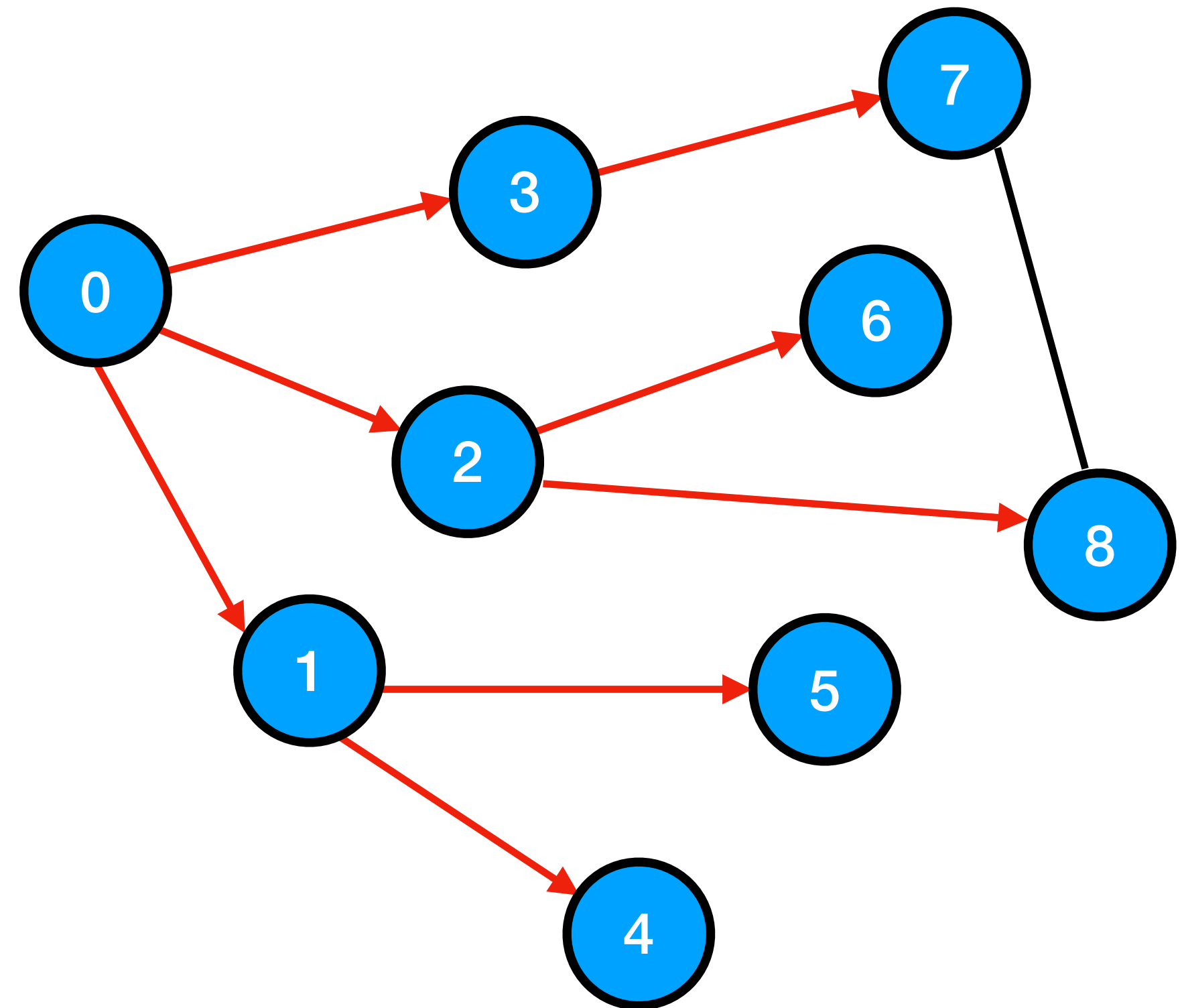
```
Adjacency list  
[  
  [1, 2],  
  [0, 2],  
  [0, 1],  
]
```

# Graph Traversals

Concept and Implementation

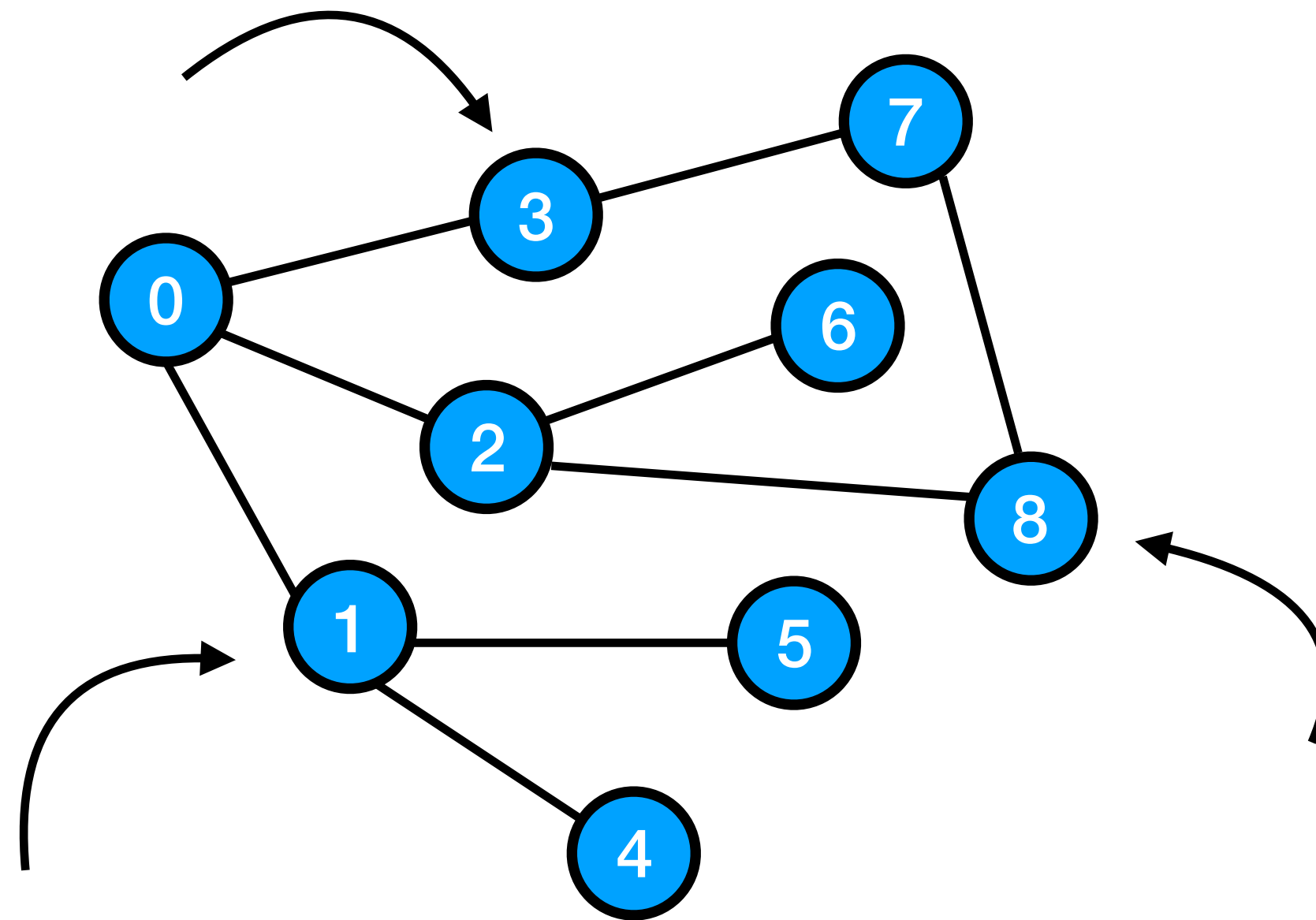
# Traverse

Process of searching through a graph by visiting vertices or nodes.



# Graph Traversal

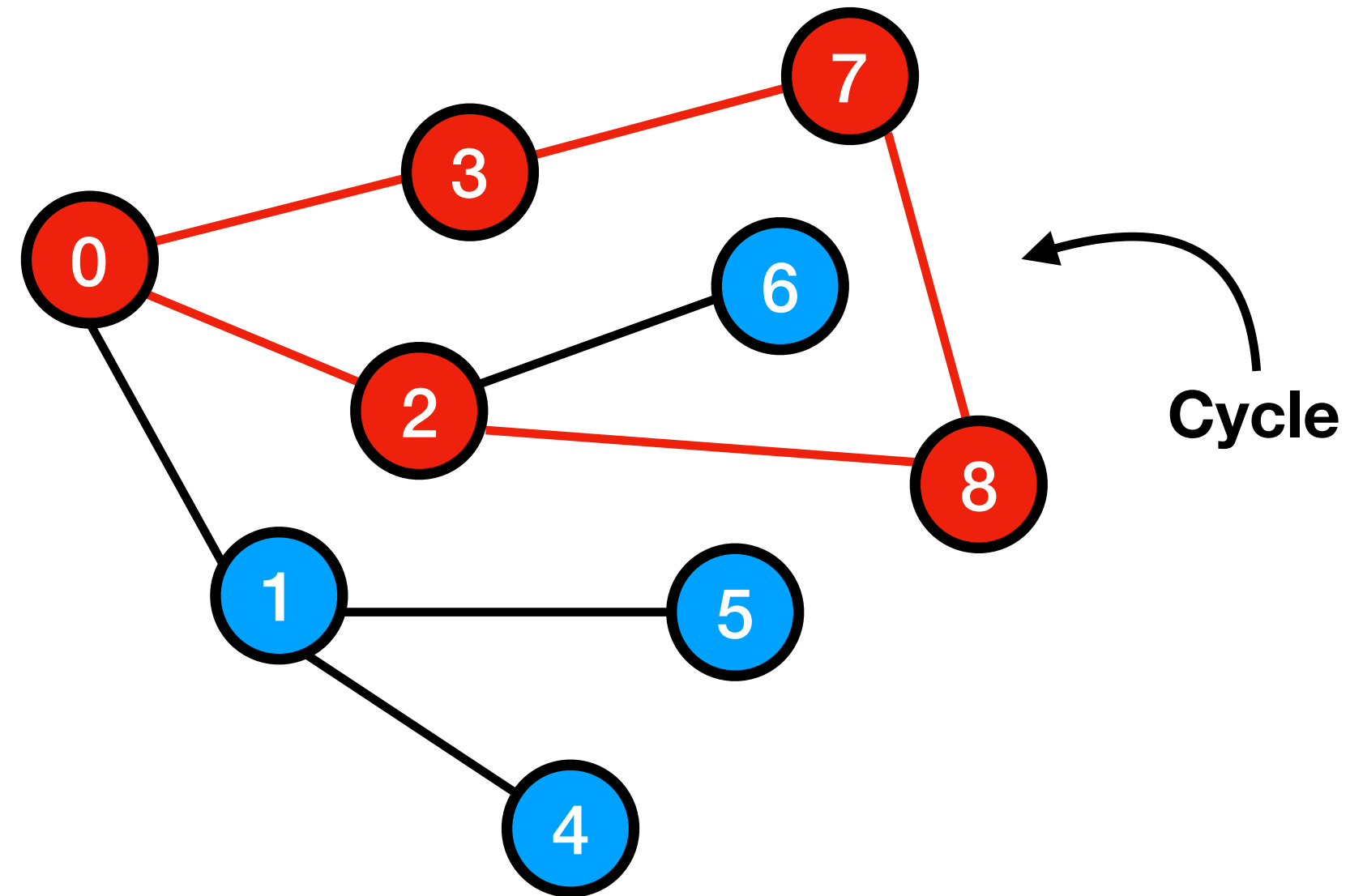
Graph traversing start with any vertex.





# Graph Traversal

Need to remember which vertex has already visited.

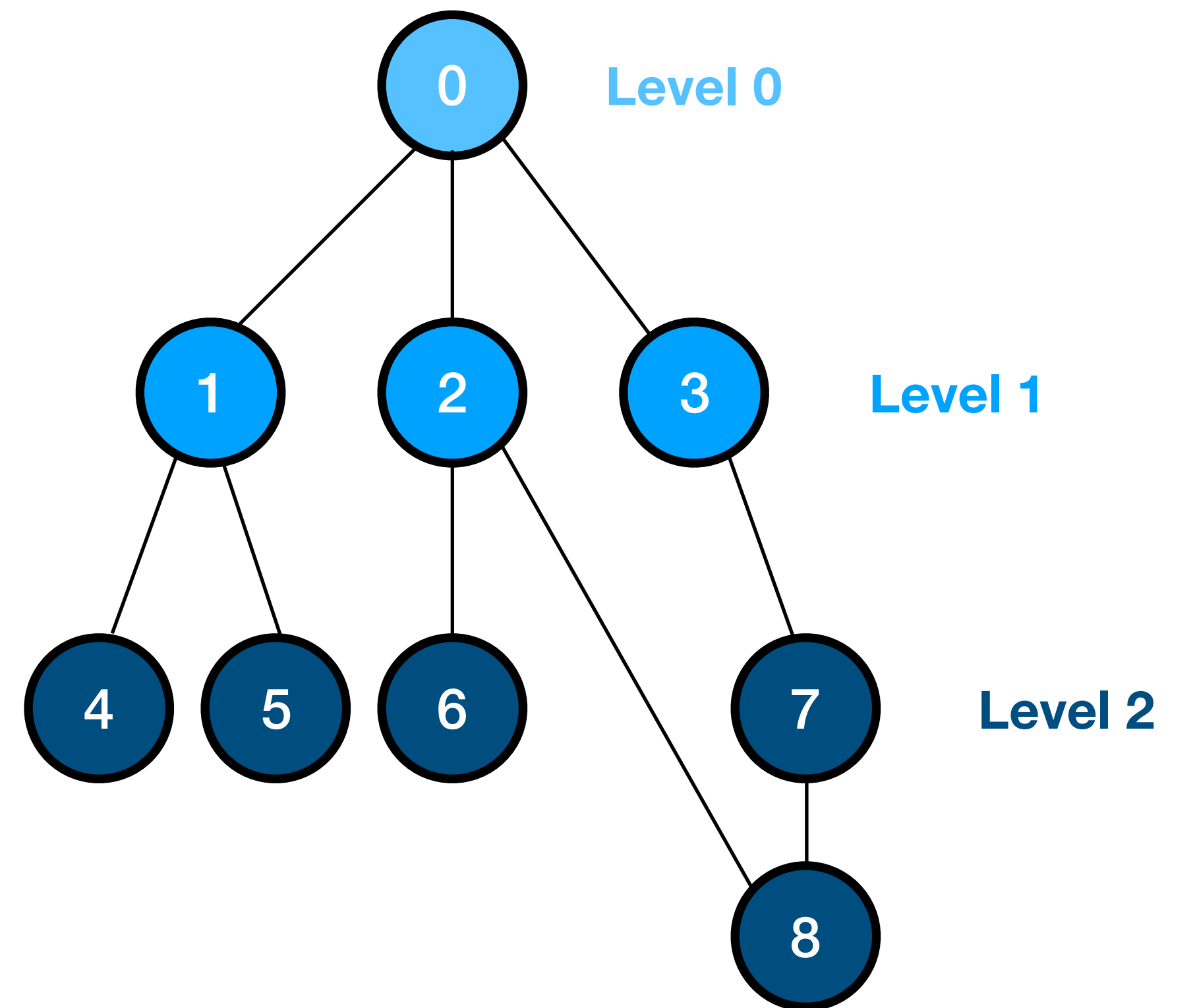


# Graph Traversal Algorithms

- Breath First Search (BFS)
- Depth First Search (DFS)

# Breath First Search (BFS)

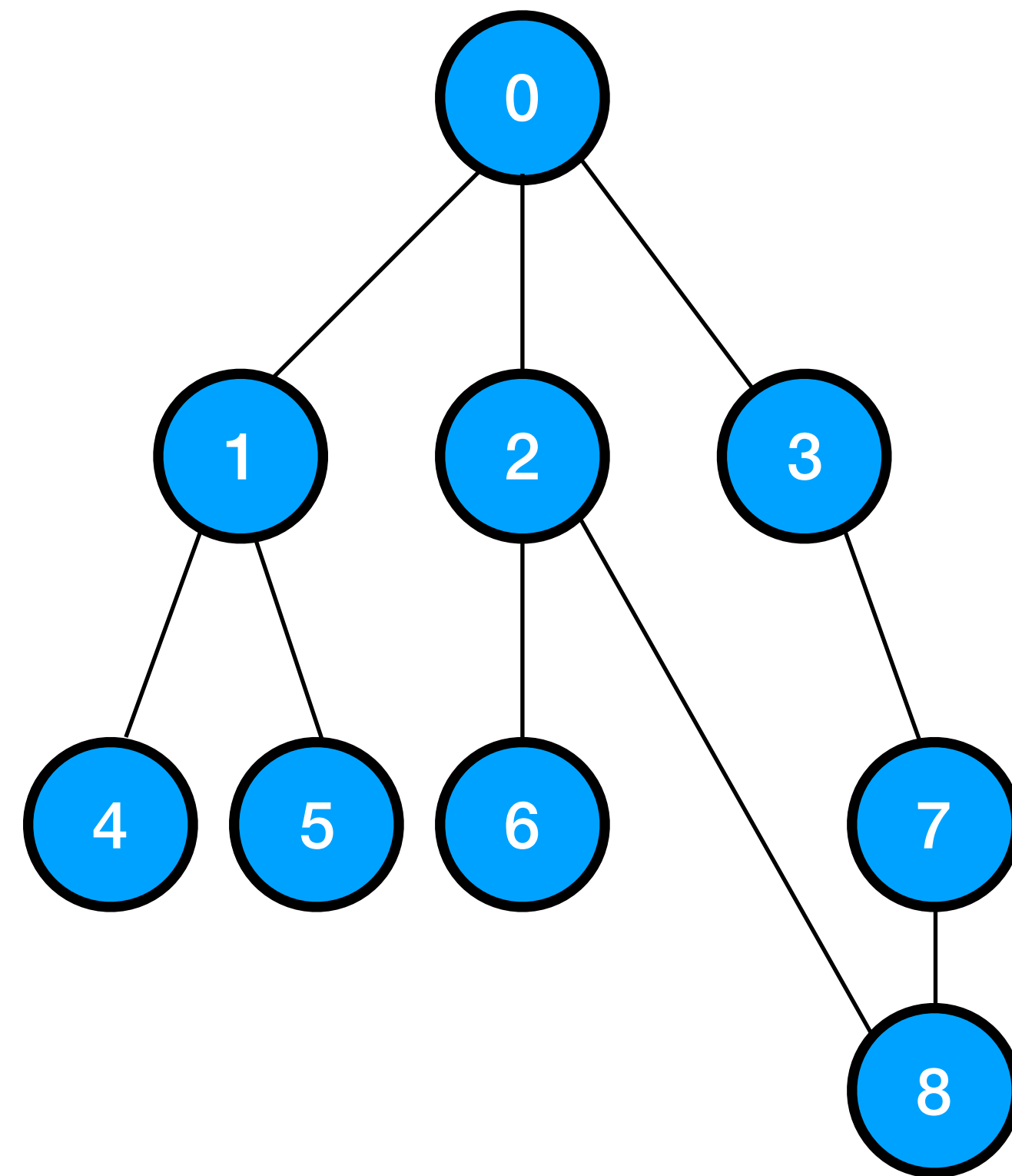
- Traverse into sibling/neighborings before children.
- Implement using queue.



# Breath First Search (BFS)



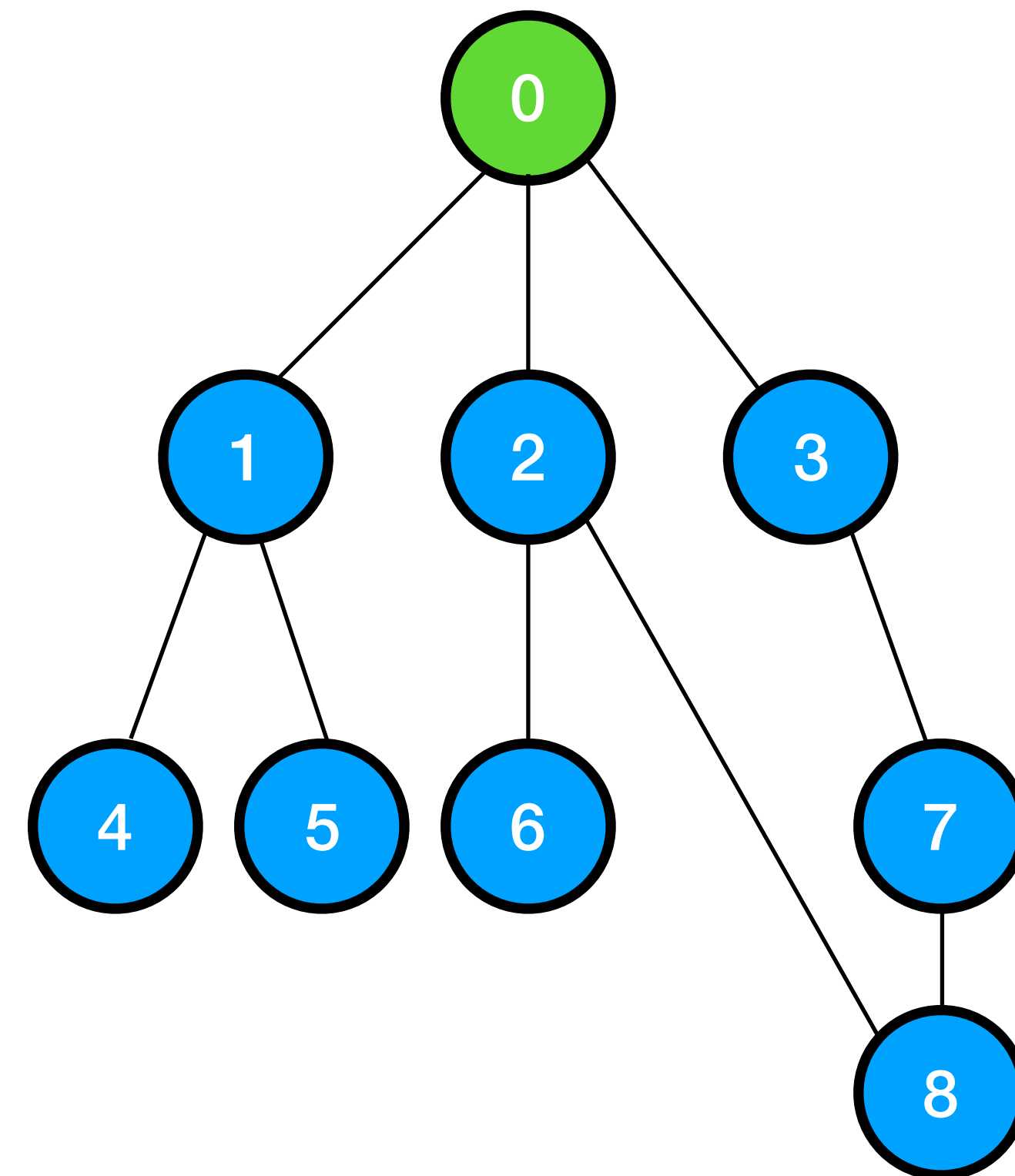
Search order :



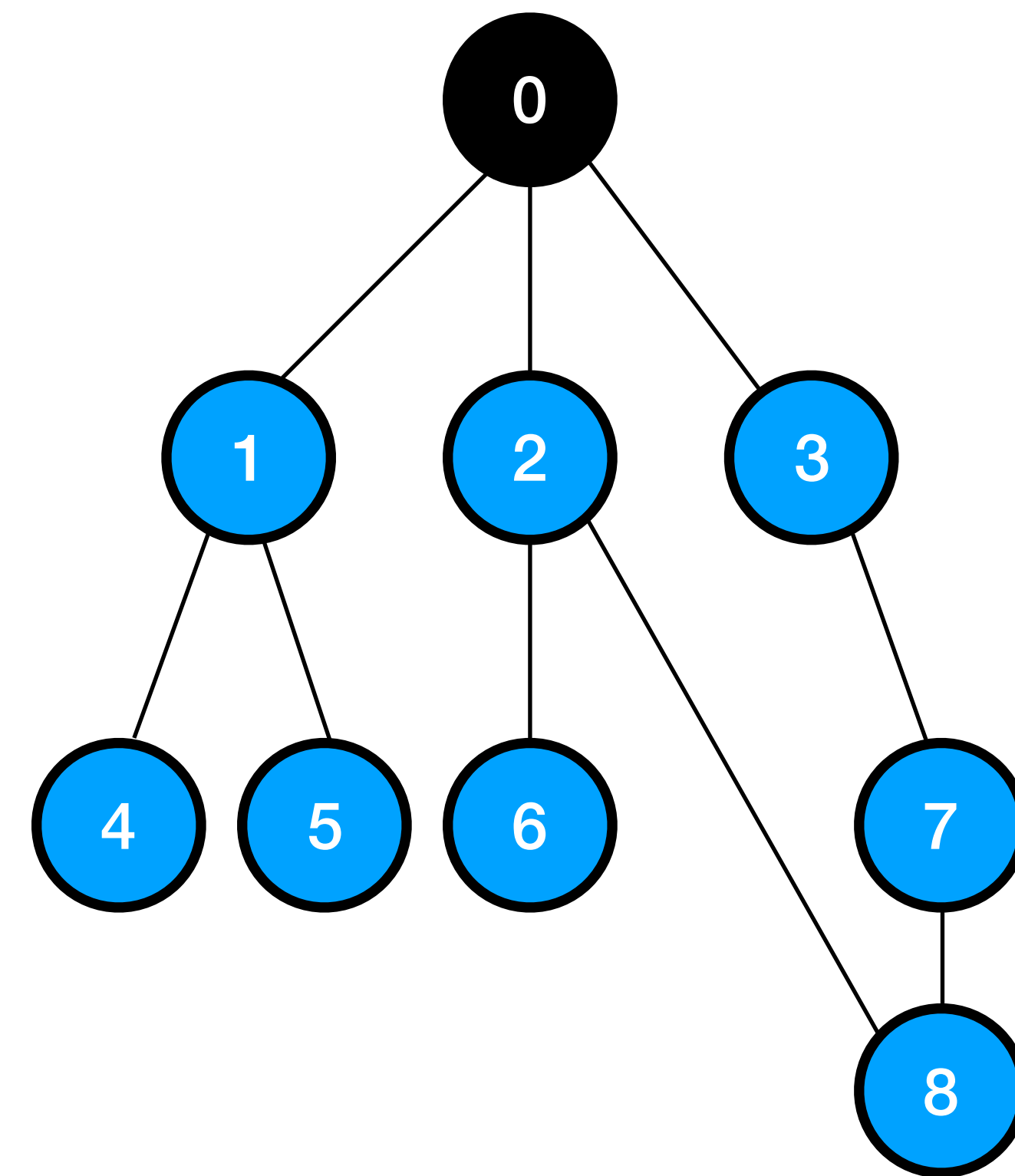
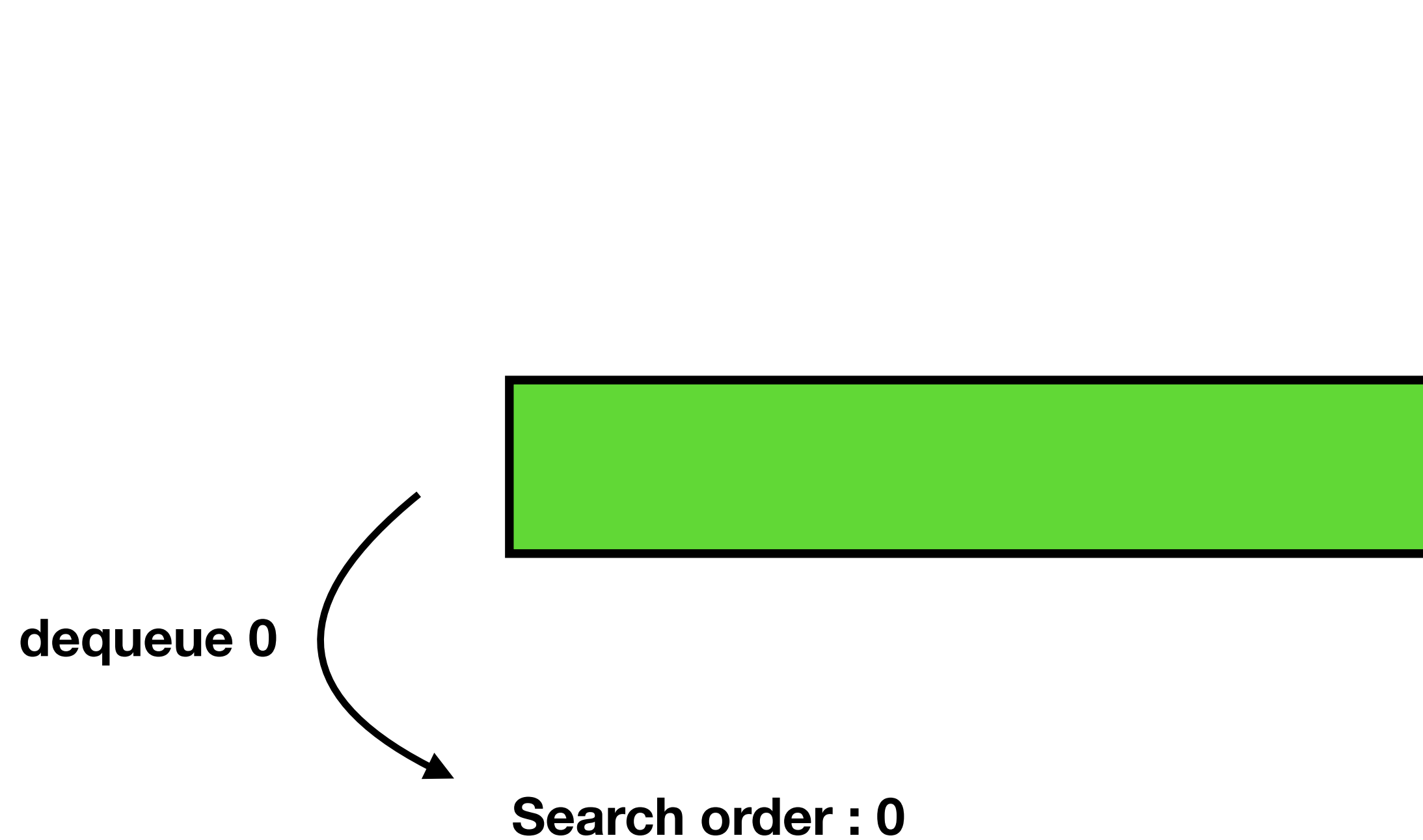
# Breath First Search (BFS)



Search order :



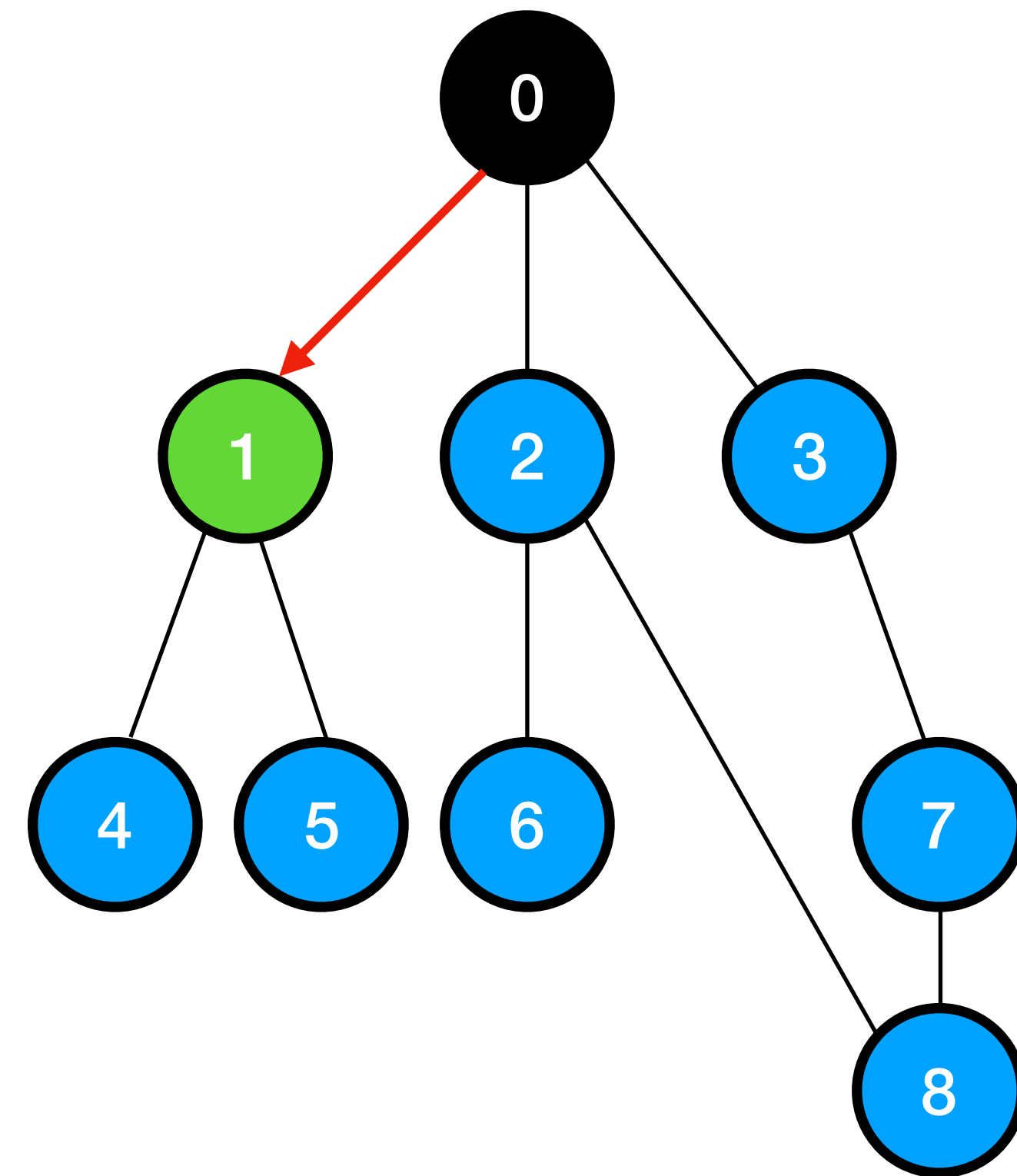
# Breath First Search (BFS)



# Breath First Search (BFS)



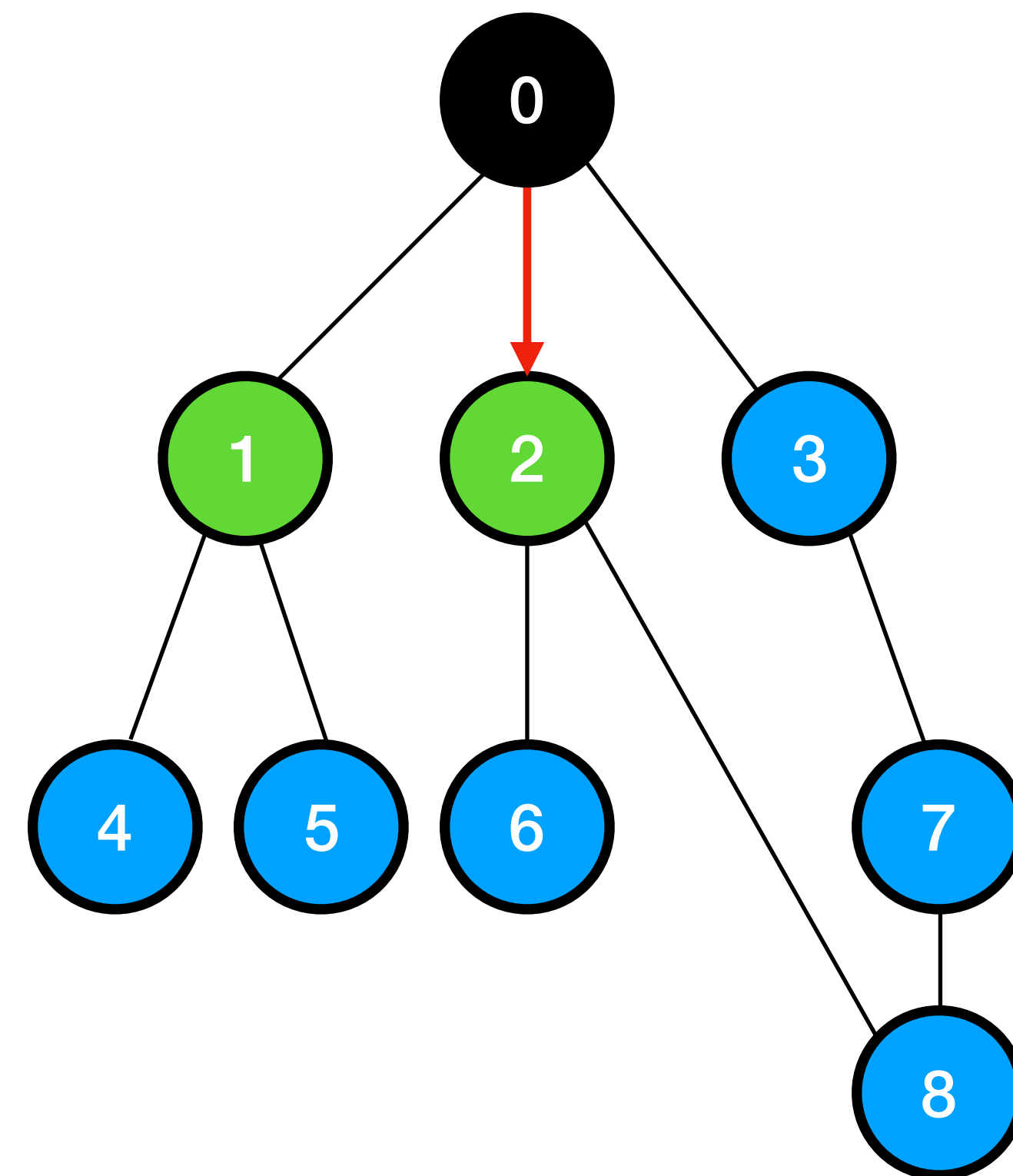
Search order : 0



# Breath First Search (BFS)



Search order : 0

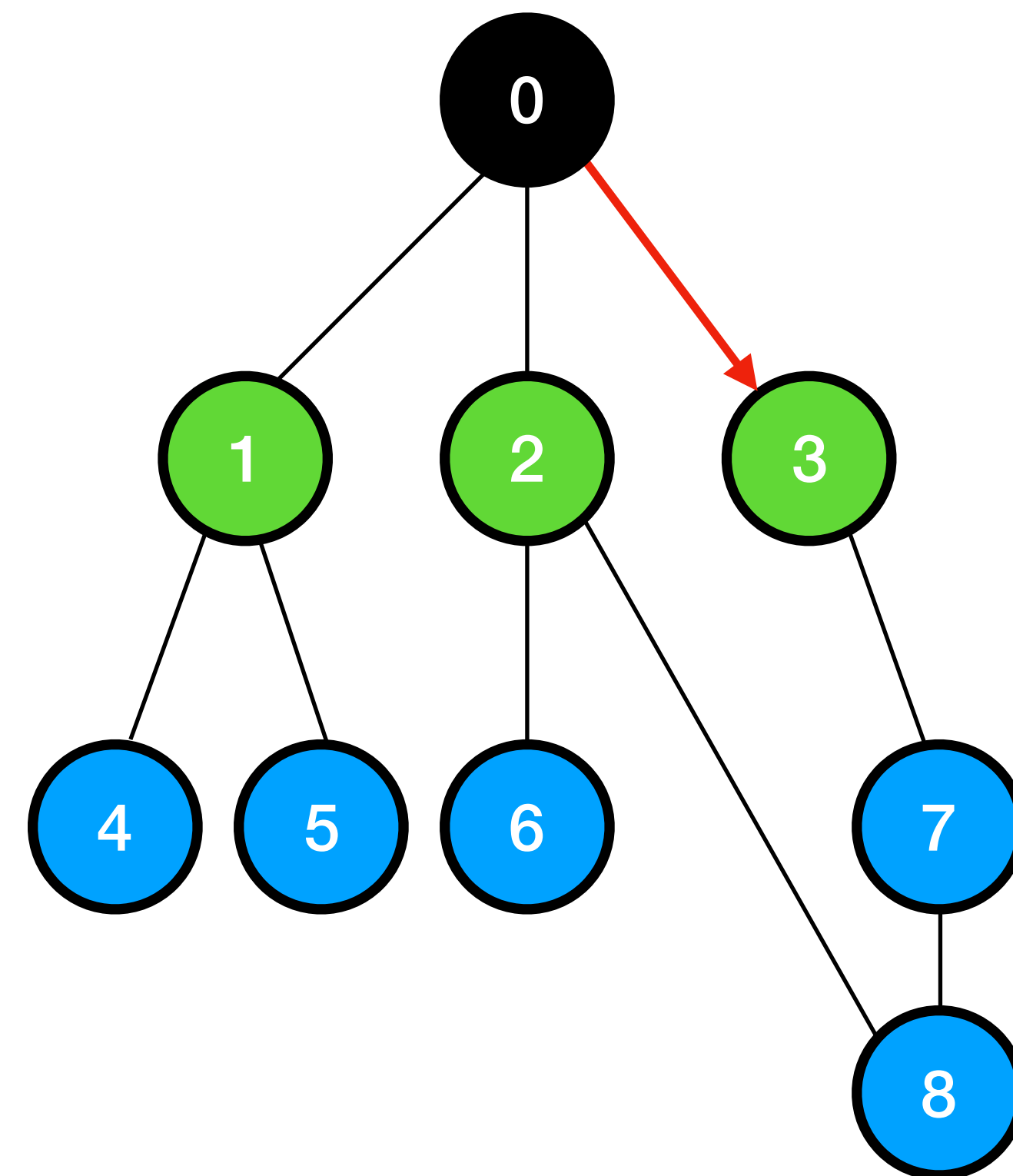




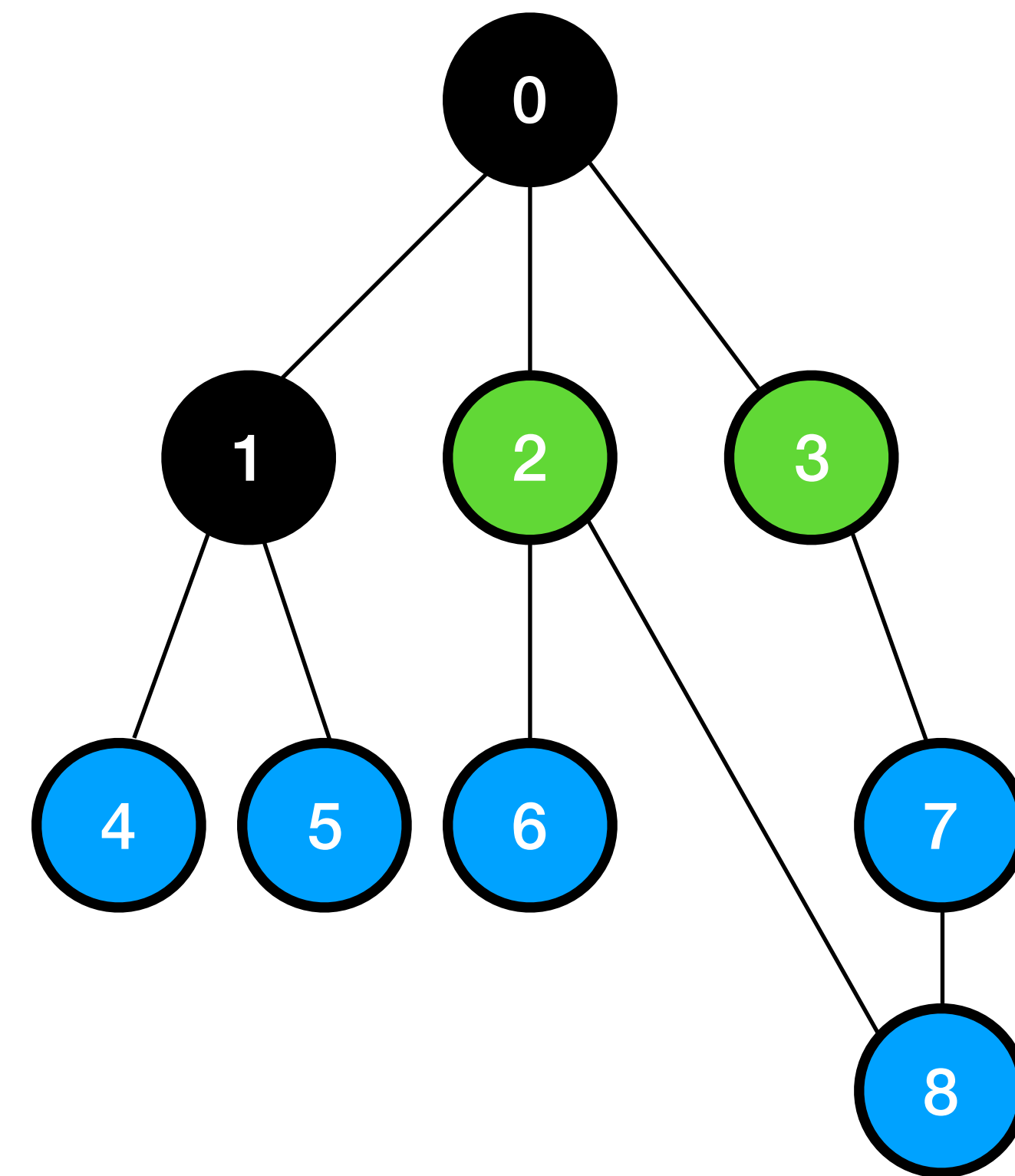
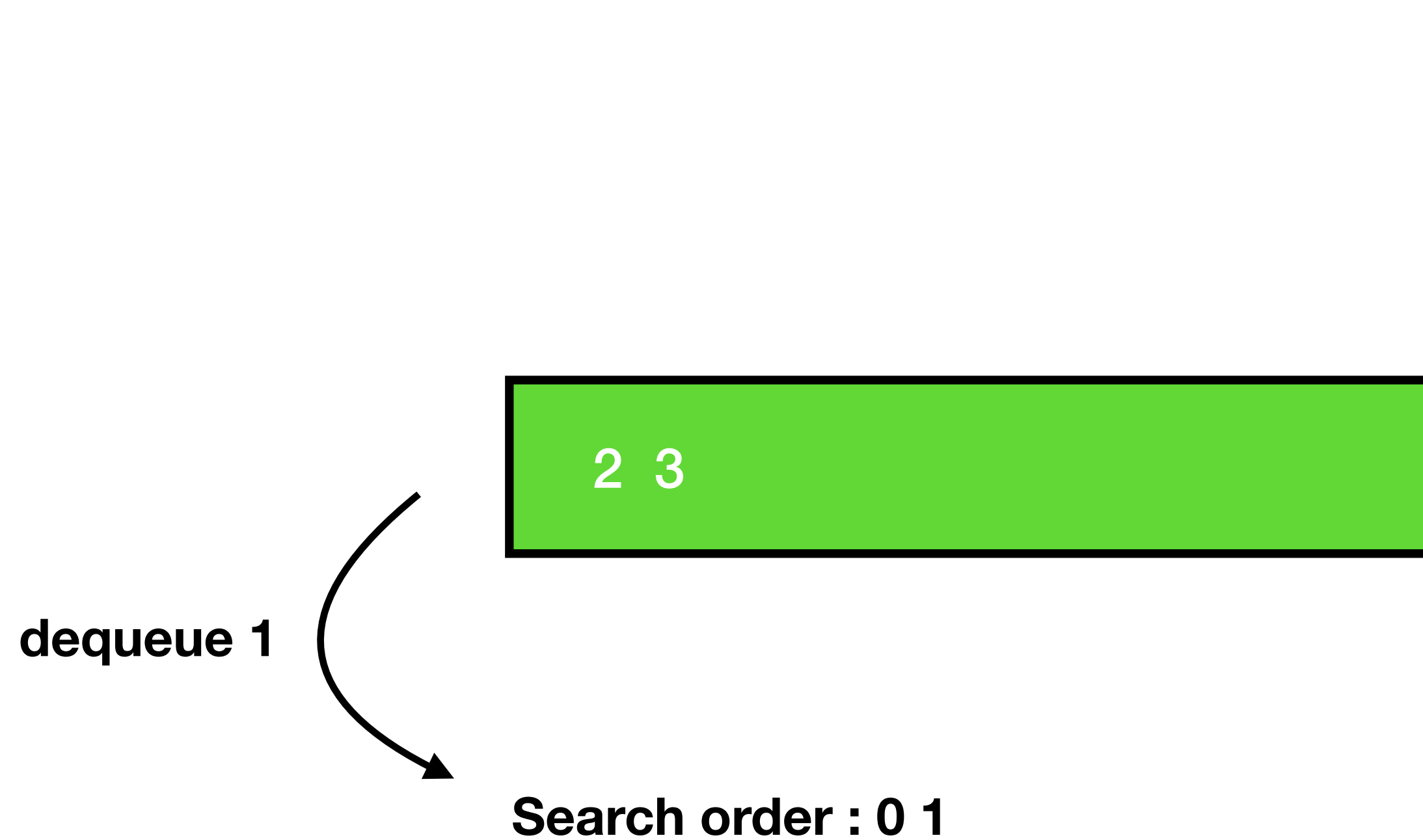
# Breath First Search (BFS)



Search order : 0



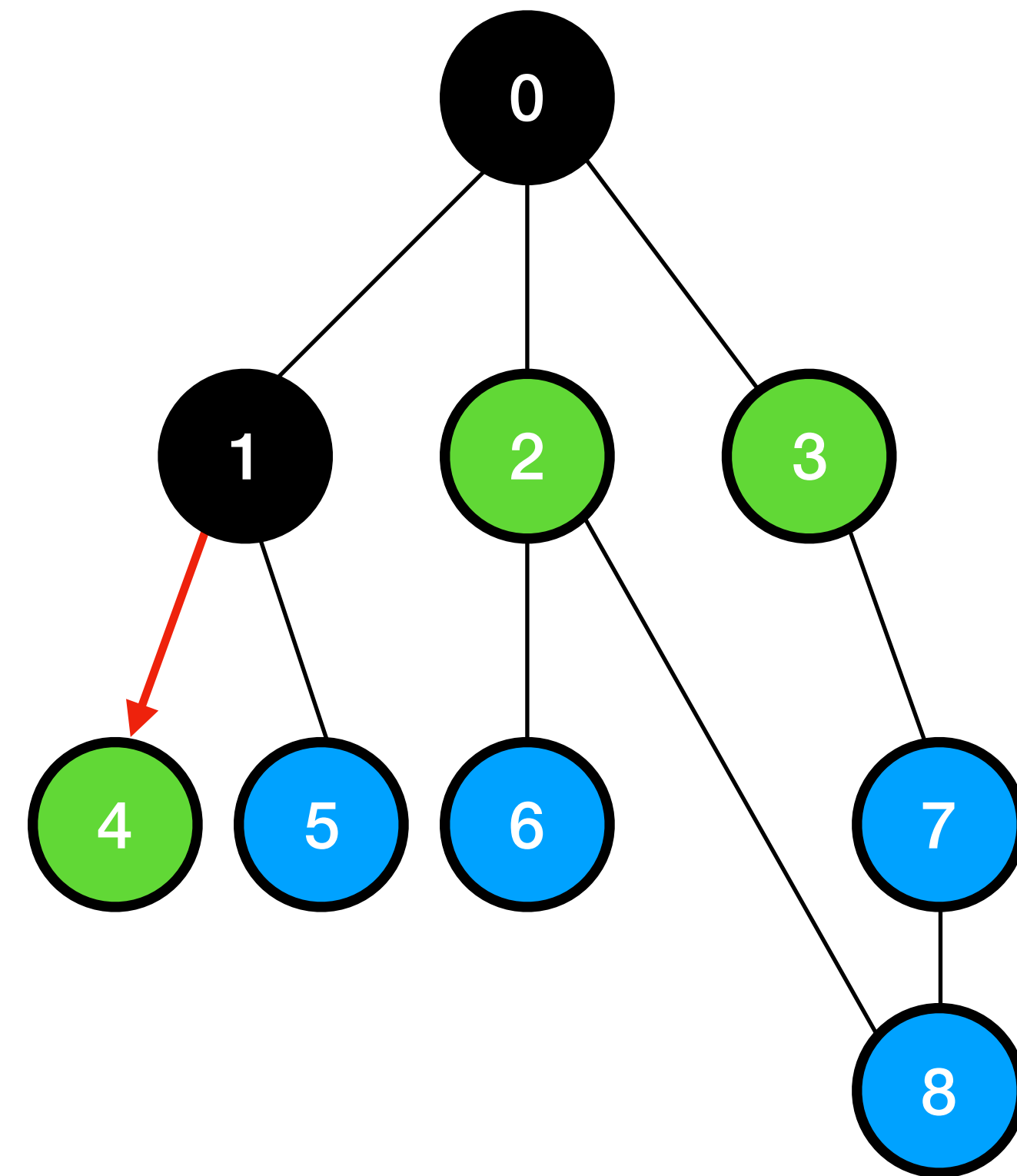
# Breath First Search (BFS)



# Breath First Search (BFS)



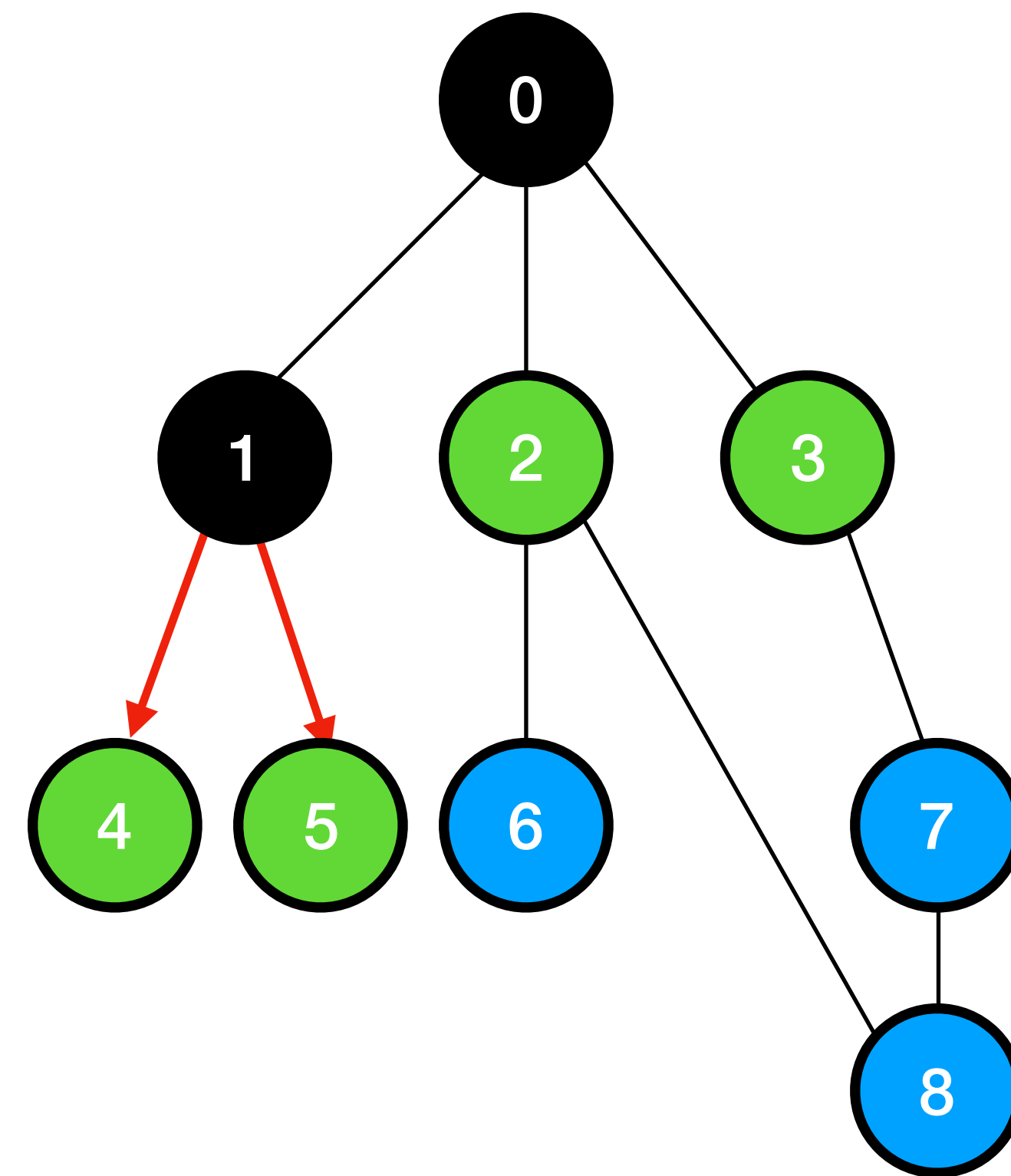
Search order : 0 1



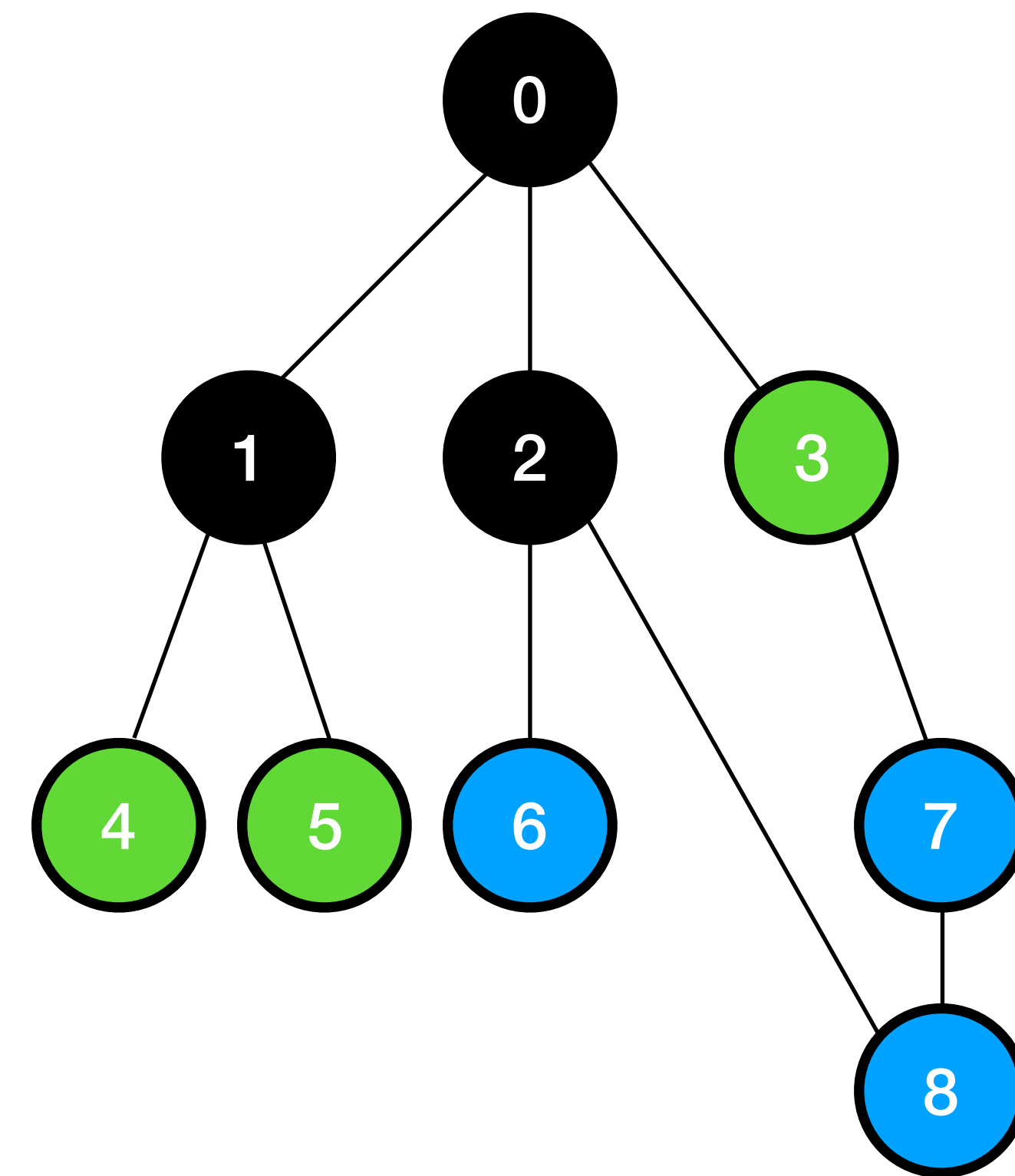
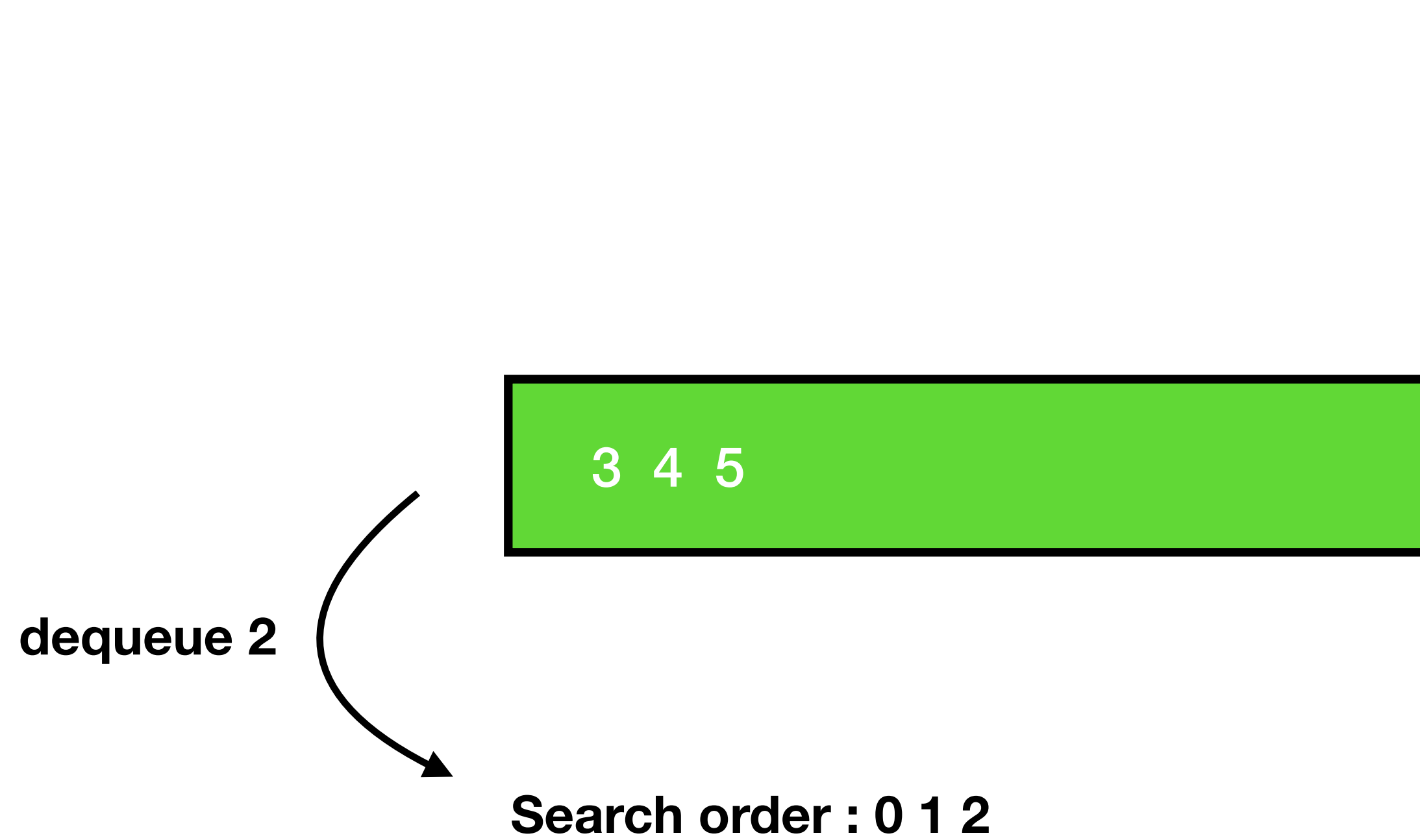
# Breath First Search (BFS)



Search order : 0 1



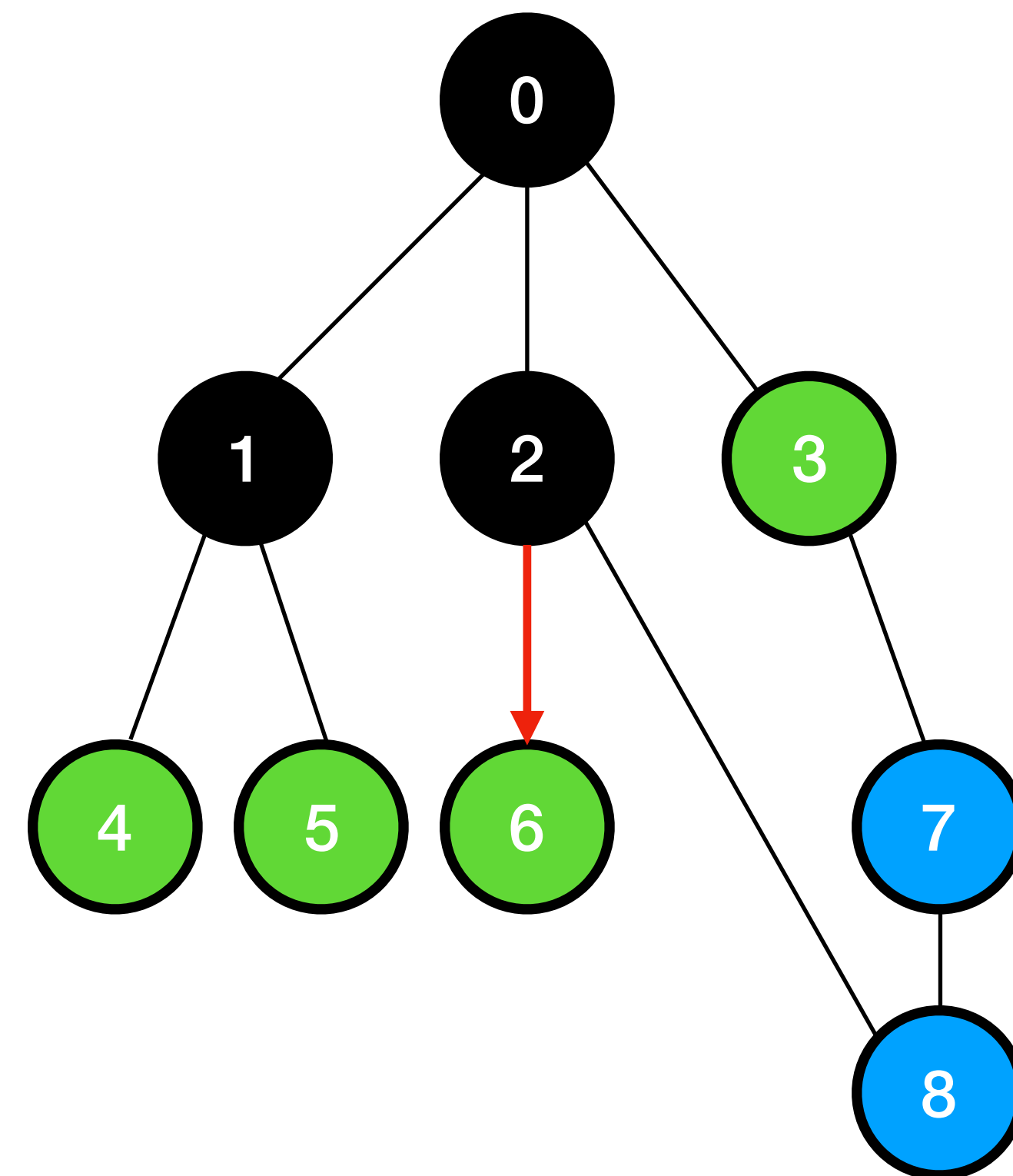
# Breath First Search (BFS)



# Breath First Search (BFS)



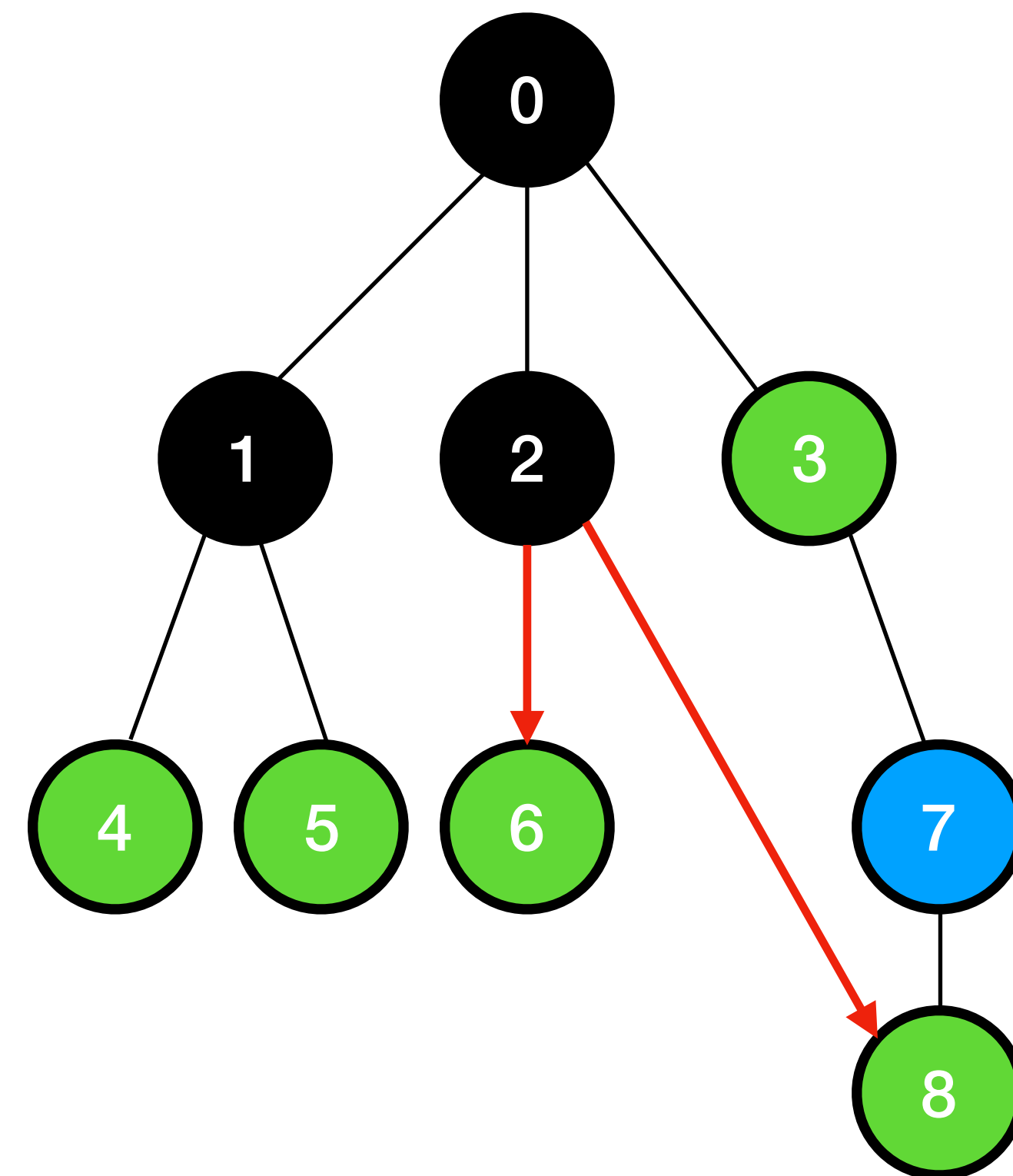
Search order : 0 1 2



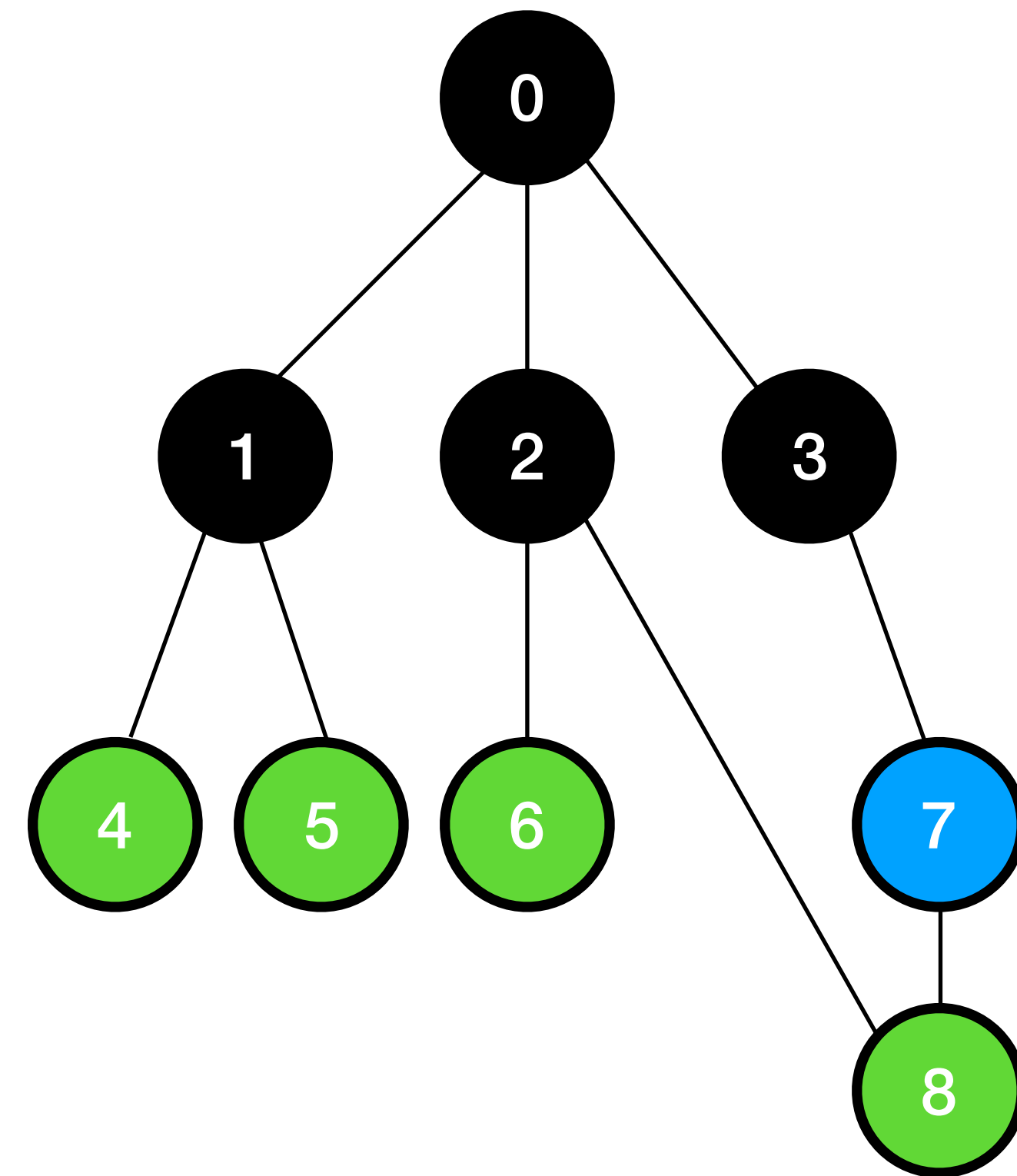
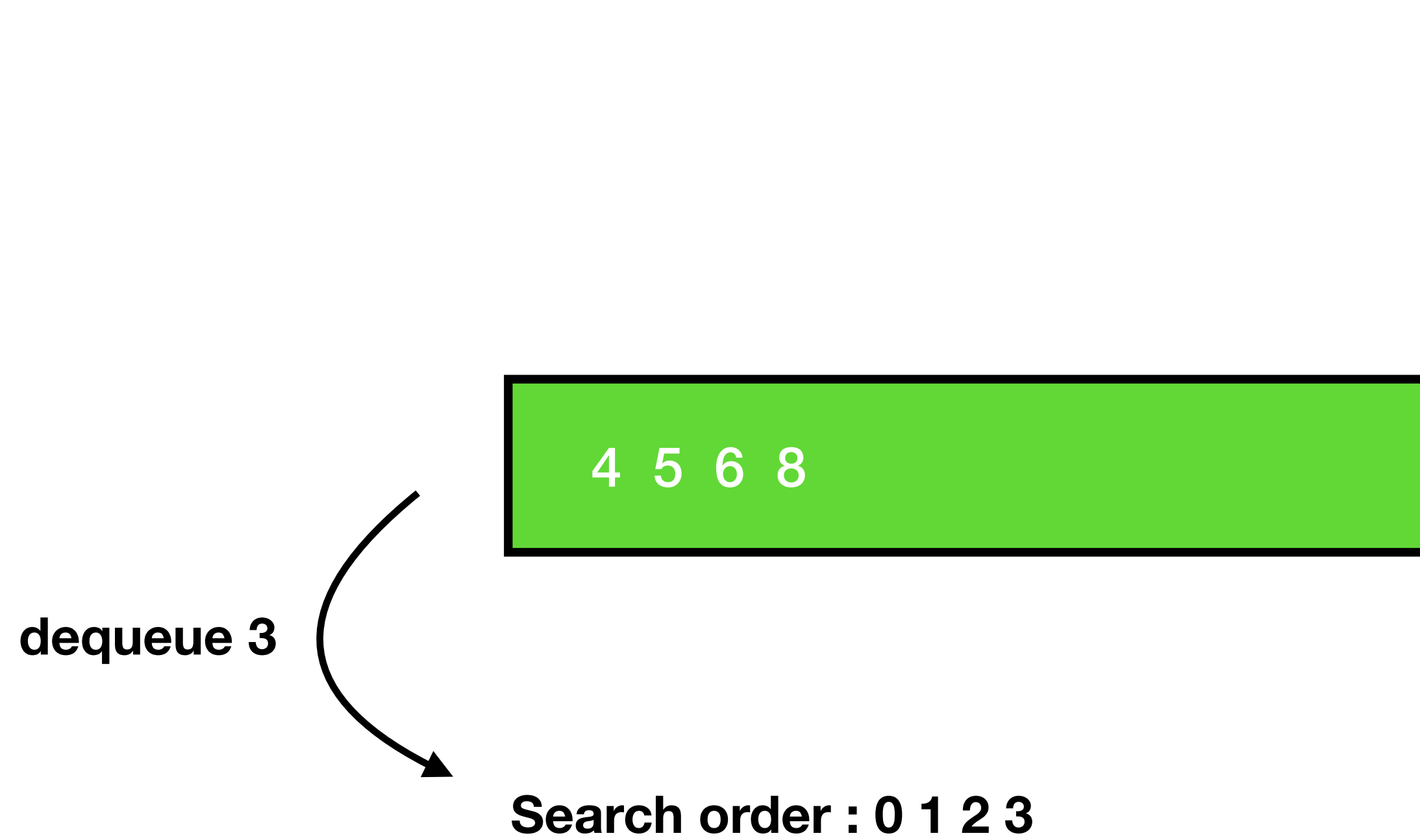
# Breath First Search (BFS)



Search order : 0 1 2



# Breath First Search (BFS)

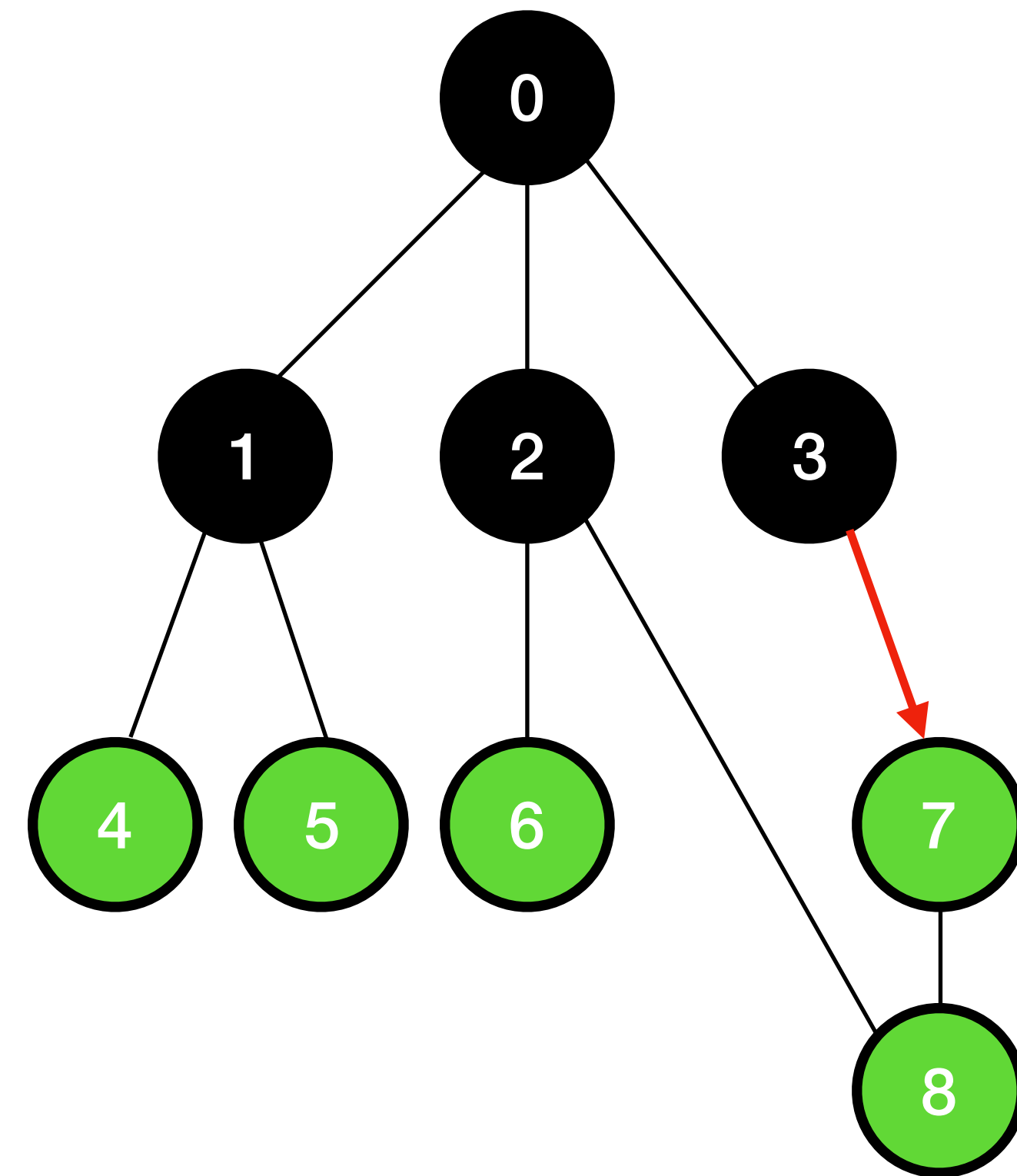




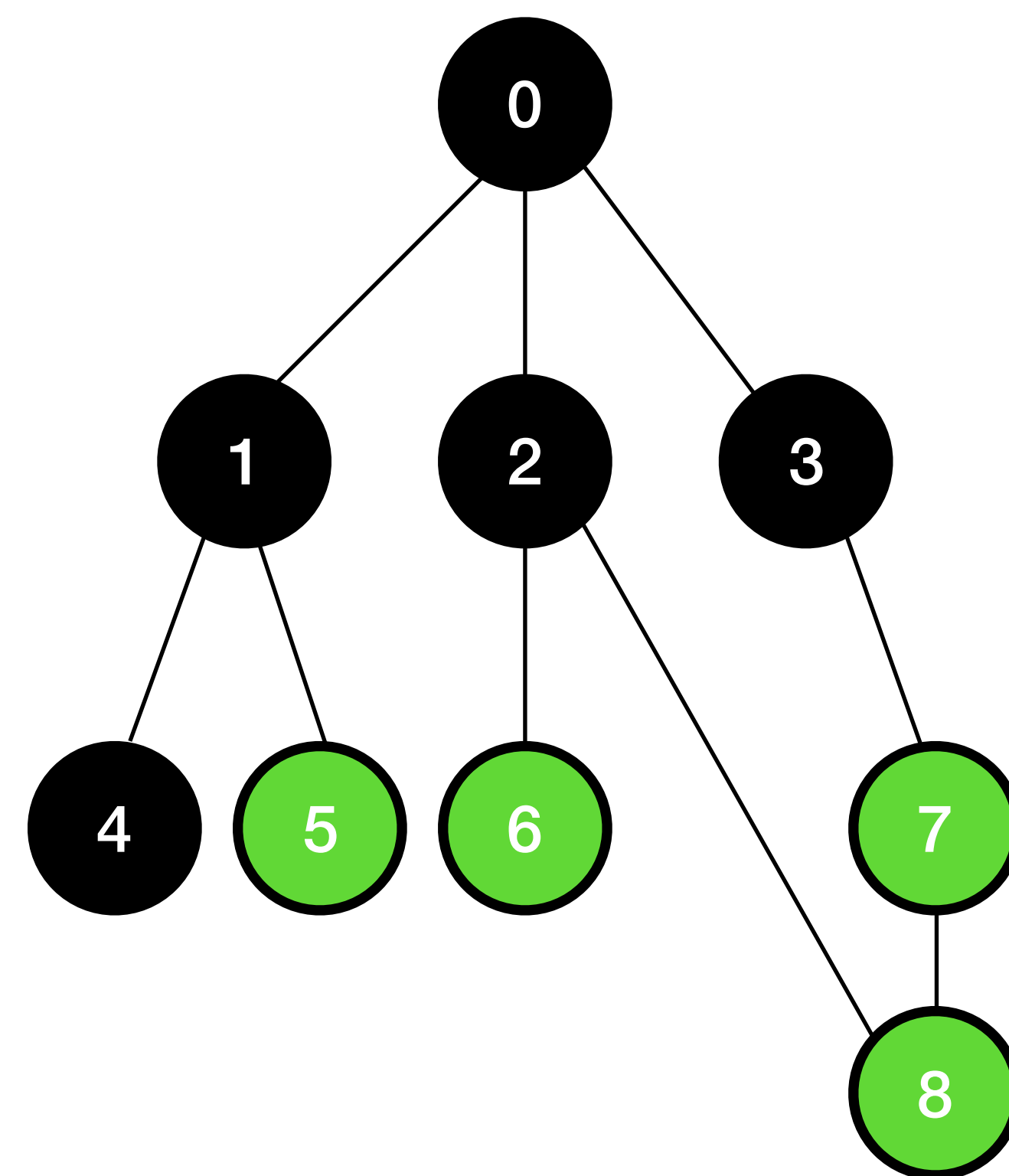
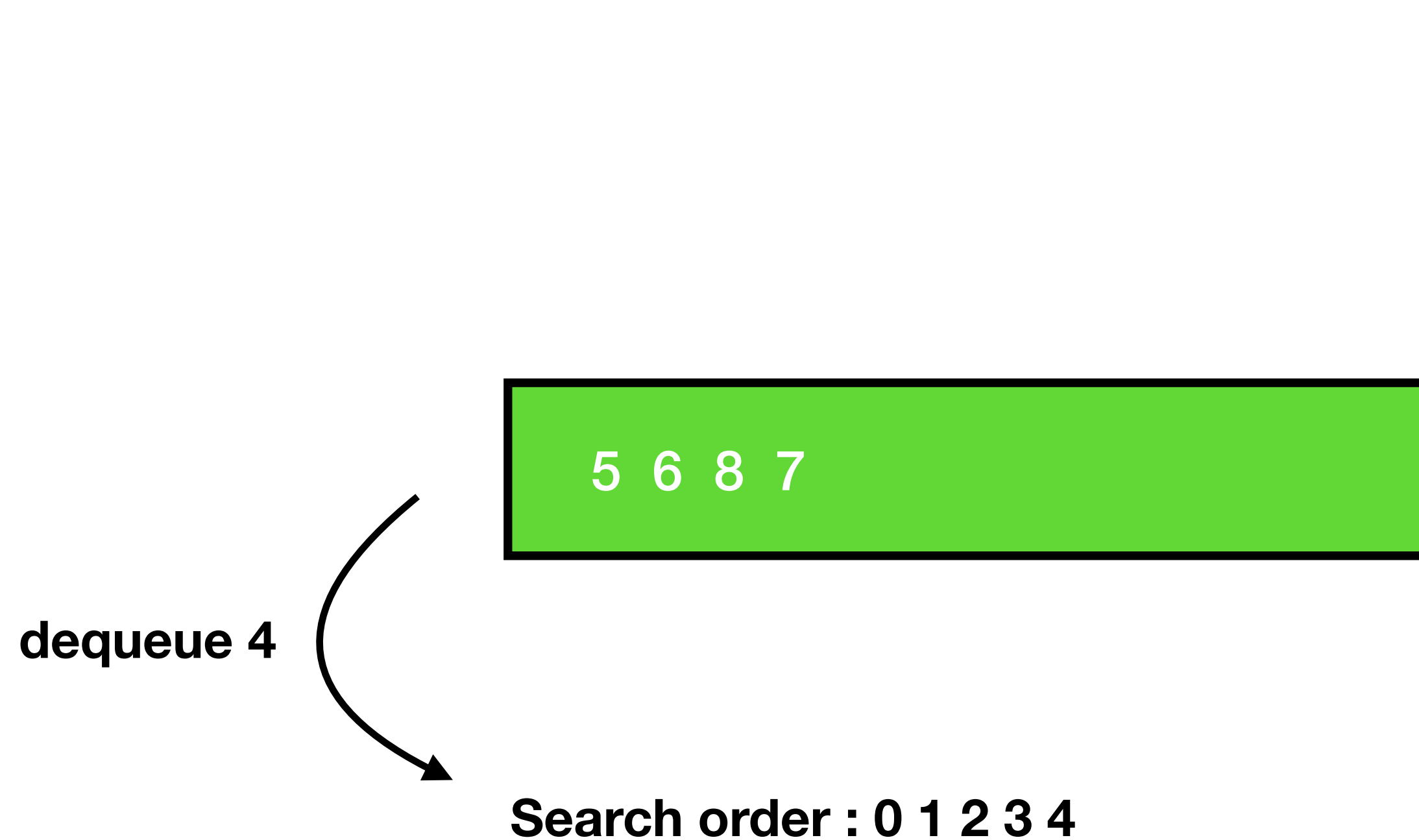
# Breath First Search (BFS)

4 5 6 8 7

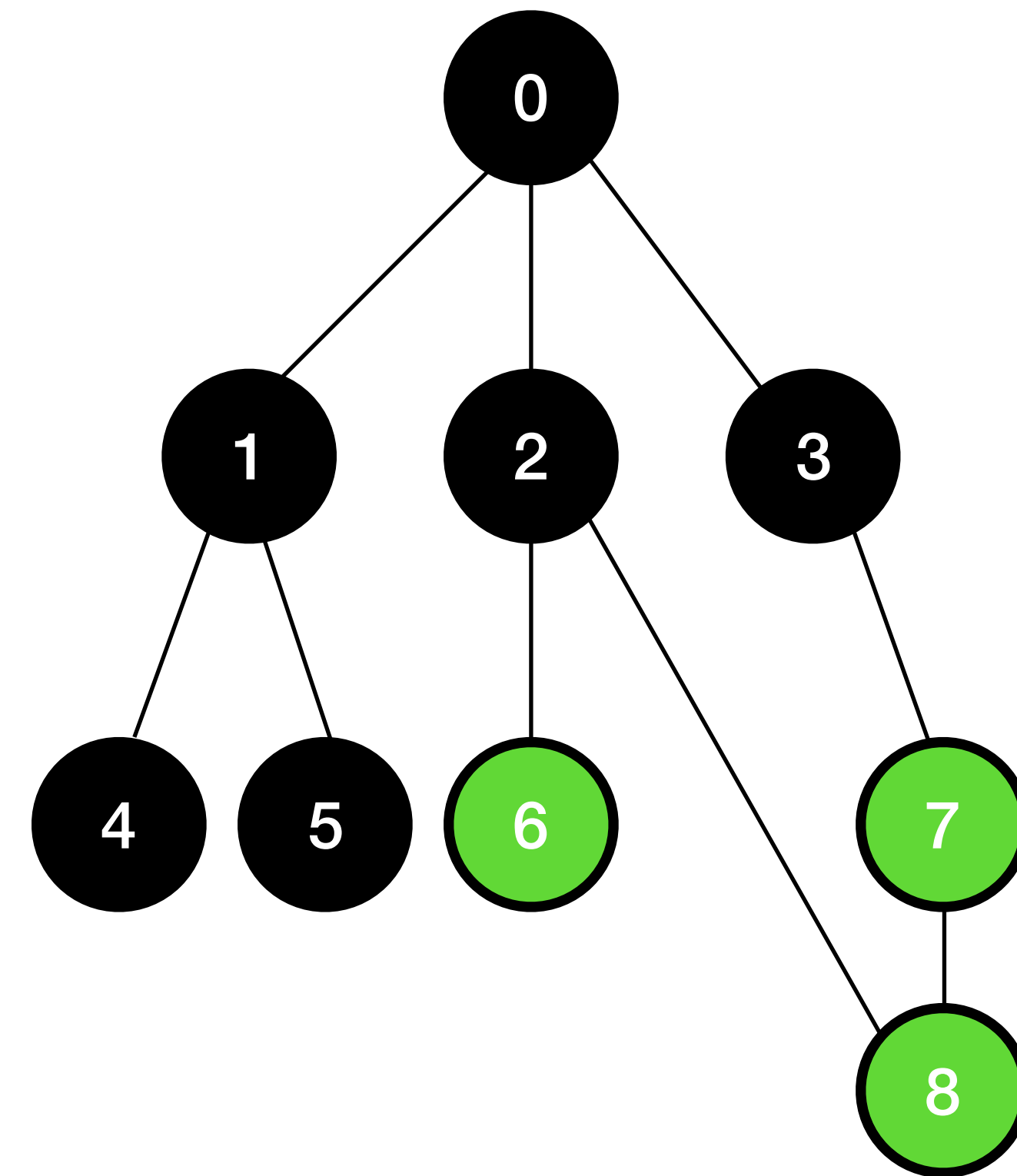
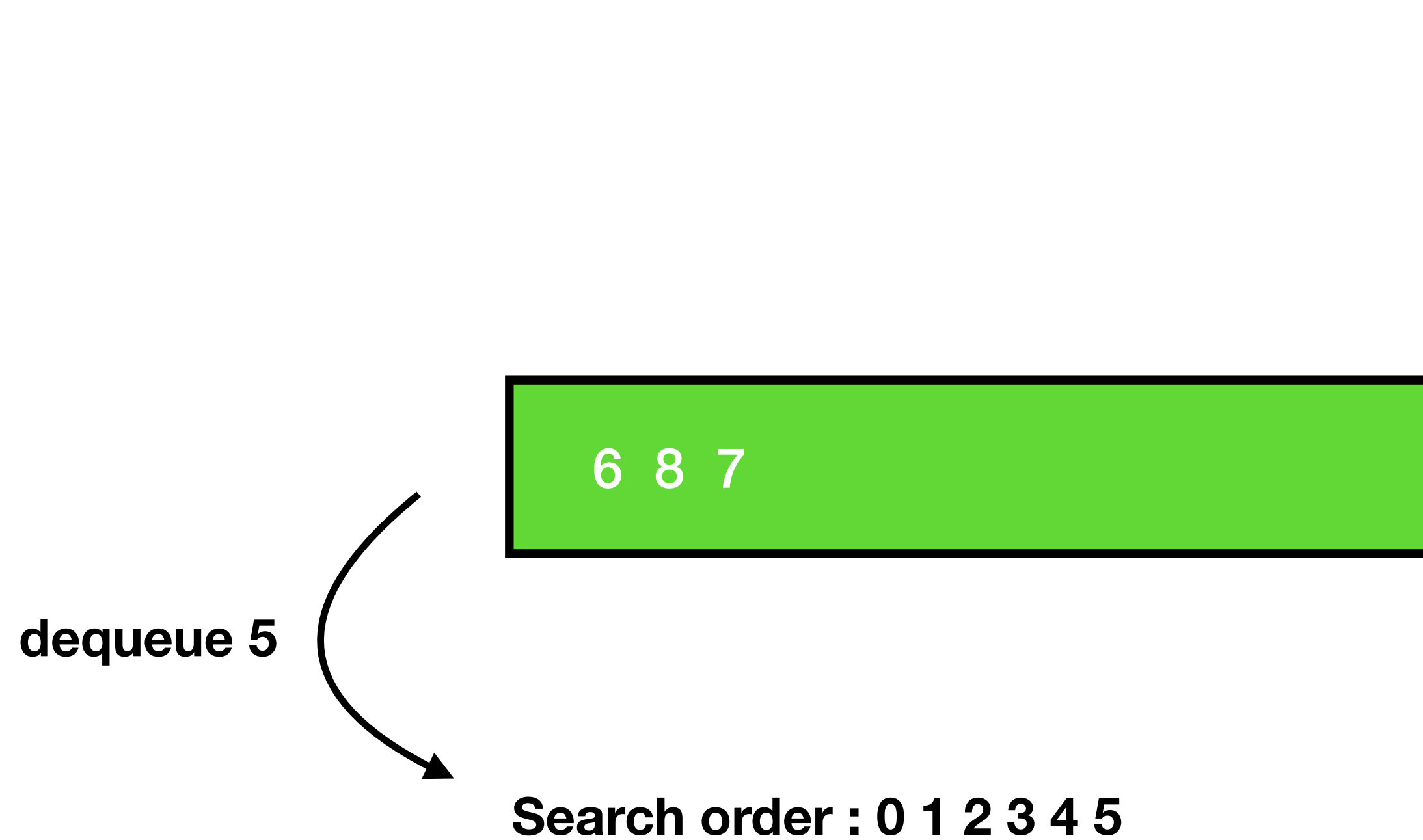
Search order : 0 1 2 3



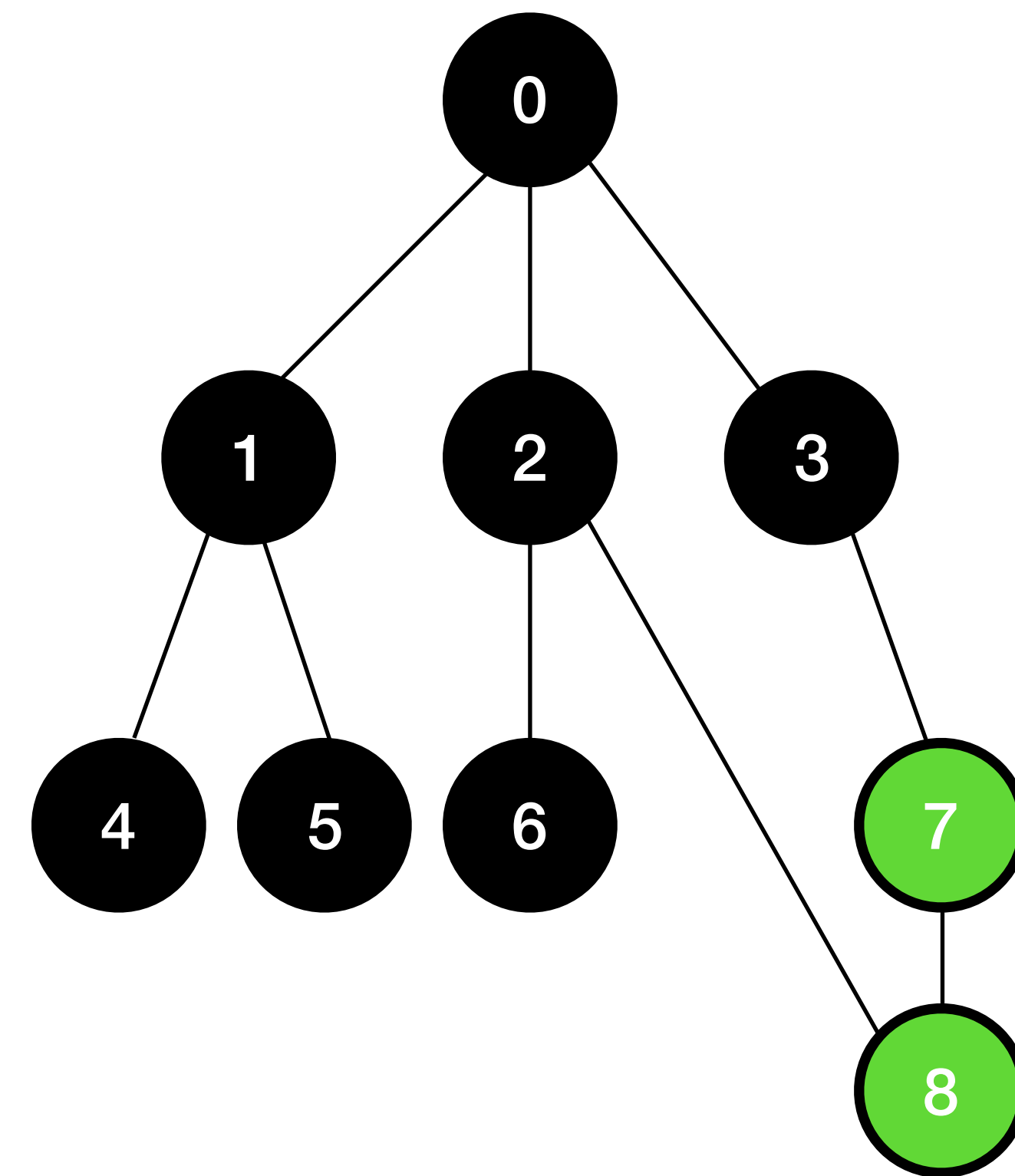
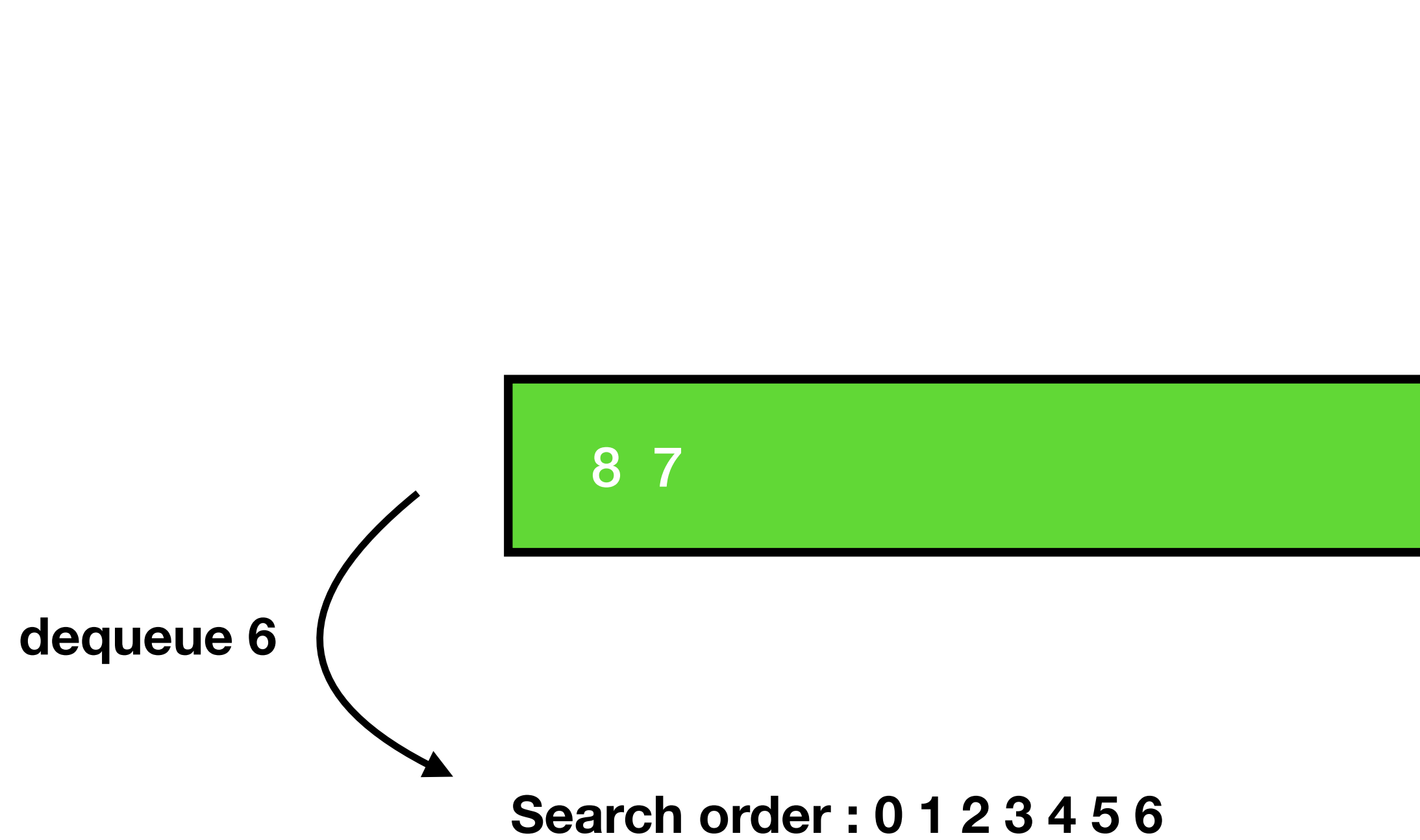
# Breath First Search (BFS)



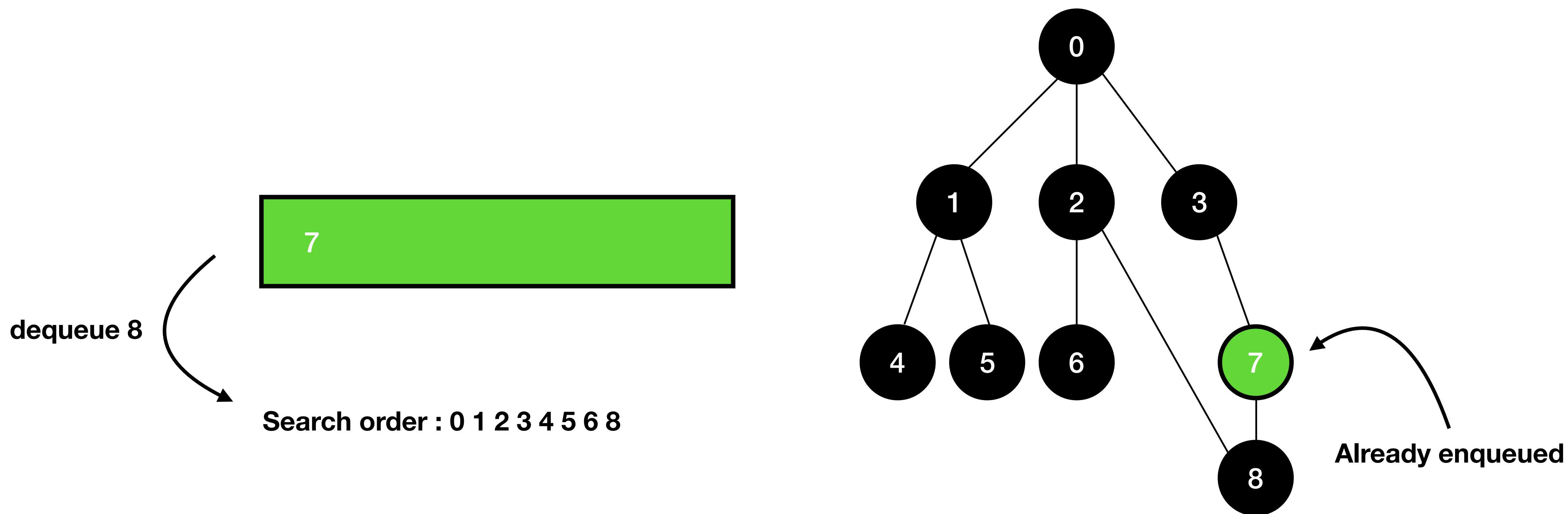
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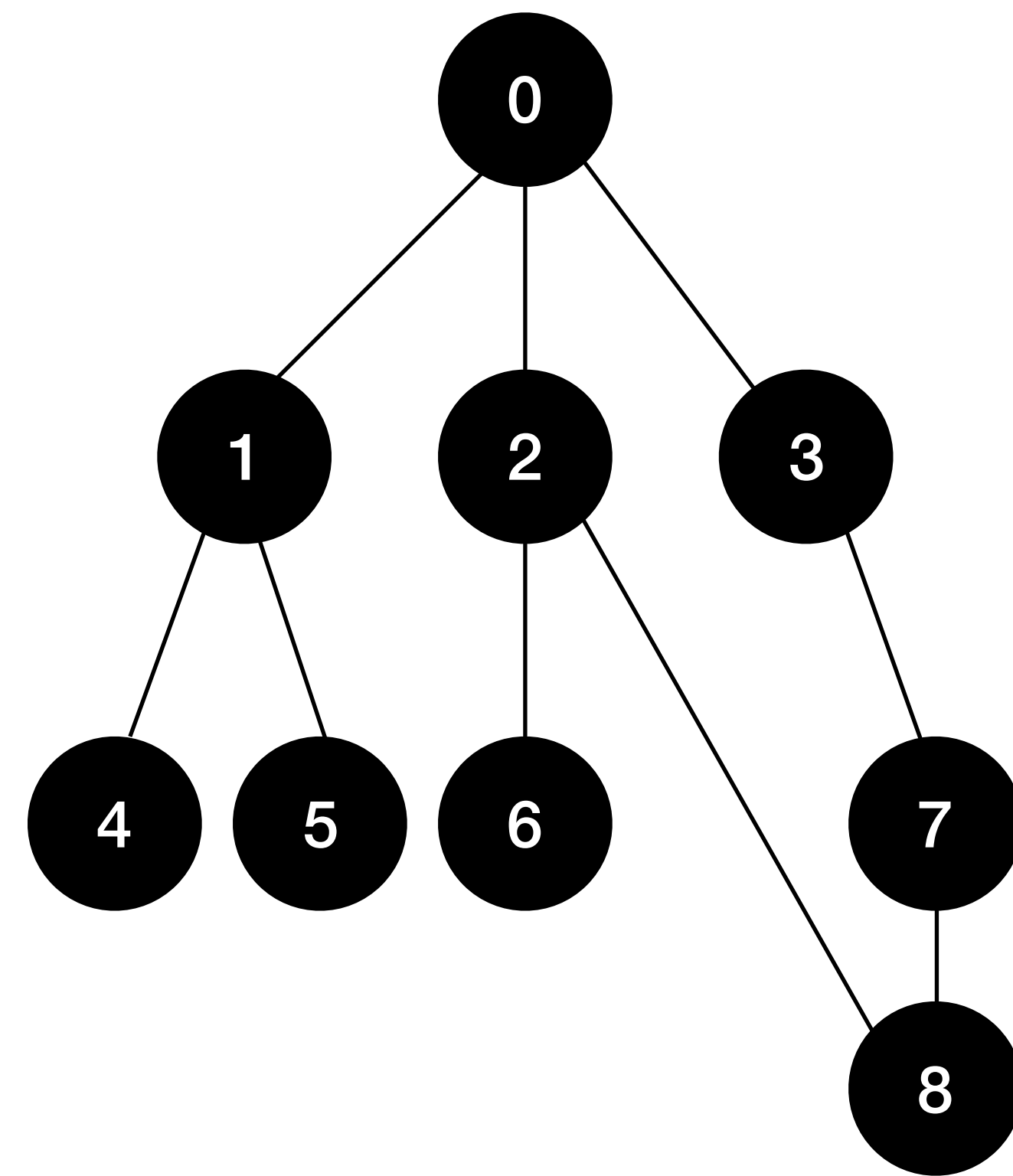
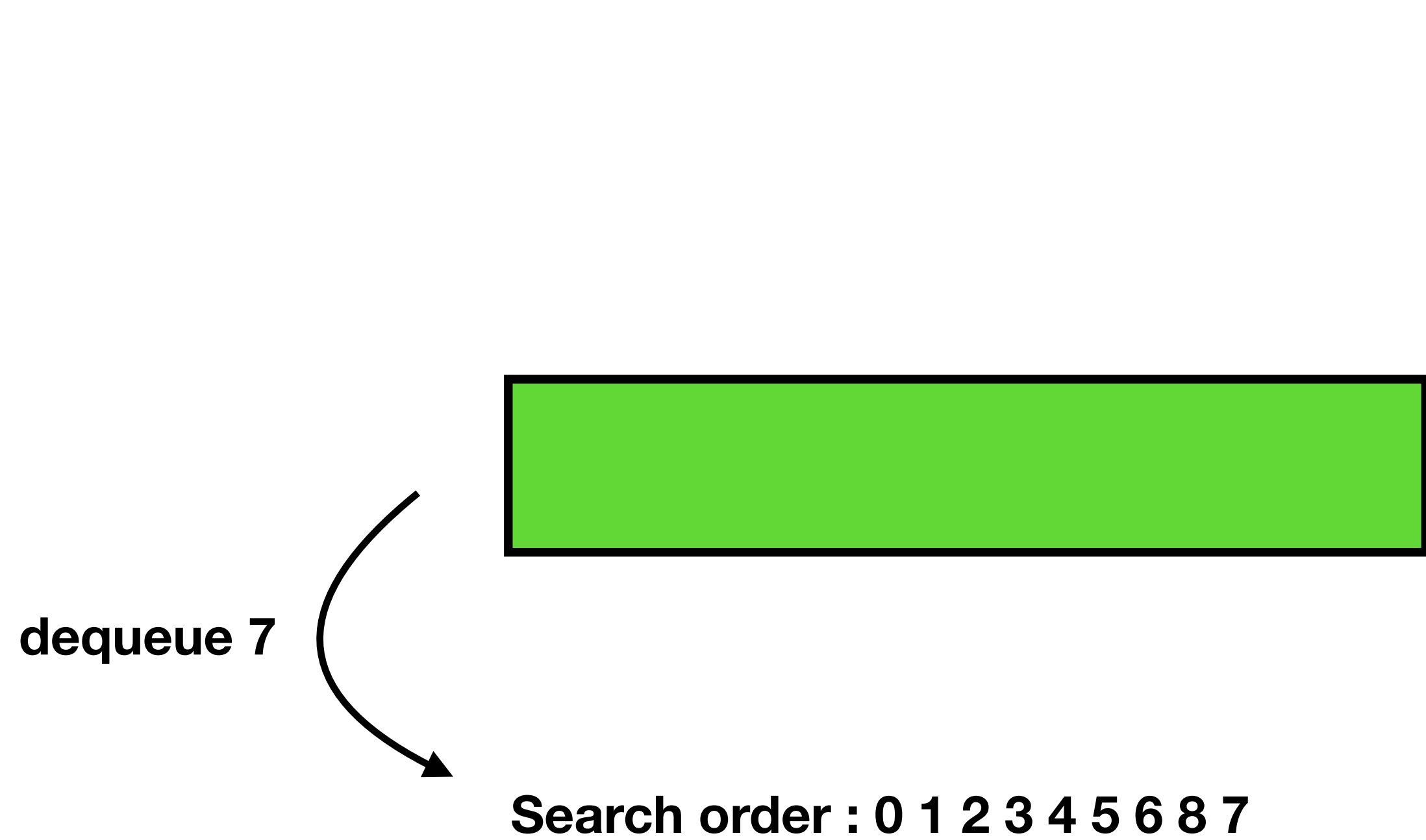
# Breath First Search (BFS)



# Breath First Search (BFS)



# Breath First Search (BFS)



# BFS Pseudocode

**bfs(startVertex)**

visitedVertices = []

queue = new Queue

queue.enqueue(startVertex)

visitedVertices[startVertex] = true

while queue.isNotEmpty

    currentVertex = queue.dequeue()

    for children of currentVertex

        if visitedVertices[children] == false

            queue.enqueue(children)

            visitedVertices[children] = true

# BFS Pseudocode

bfs(startVertex)

**visitedVertices = []**

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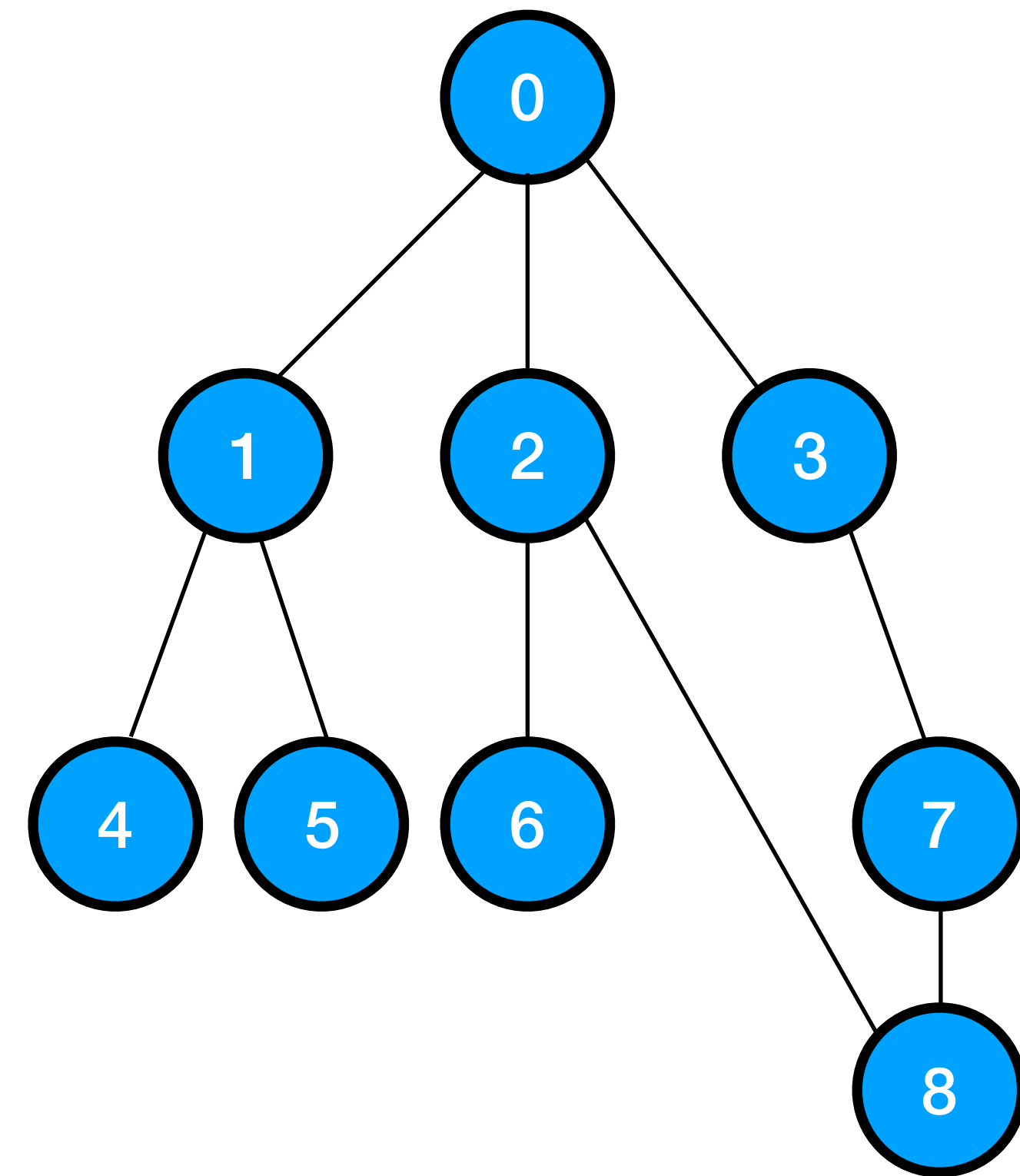
# BFS Pseudocode

```
bfs(startVertex)
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    queue = new Queue
    queue.enqueue(startVertex)
    visitedVertices[startVertex] = true

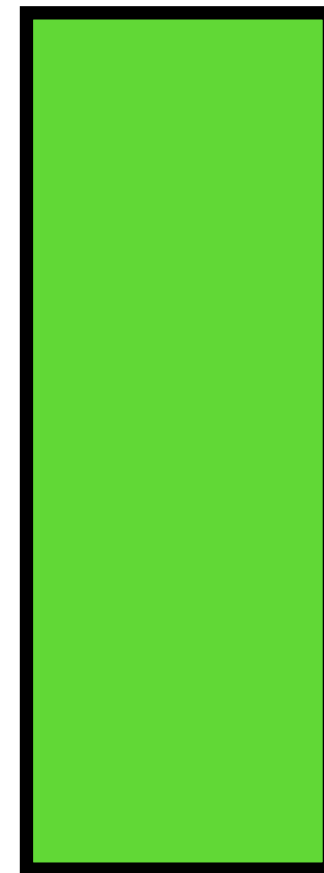
    while queue.isNotEmpty
        currentVertex = queue.dequeue()
        for children of currentVertex
            if visitedVertices[children] == false
                queue.enqueue(children)
                visitedVertices[children] = true
```

# Depth First Search (DFS)

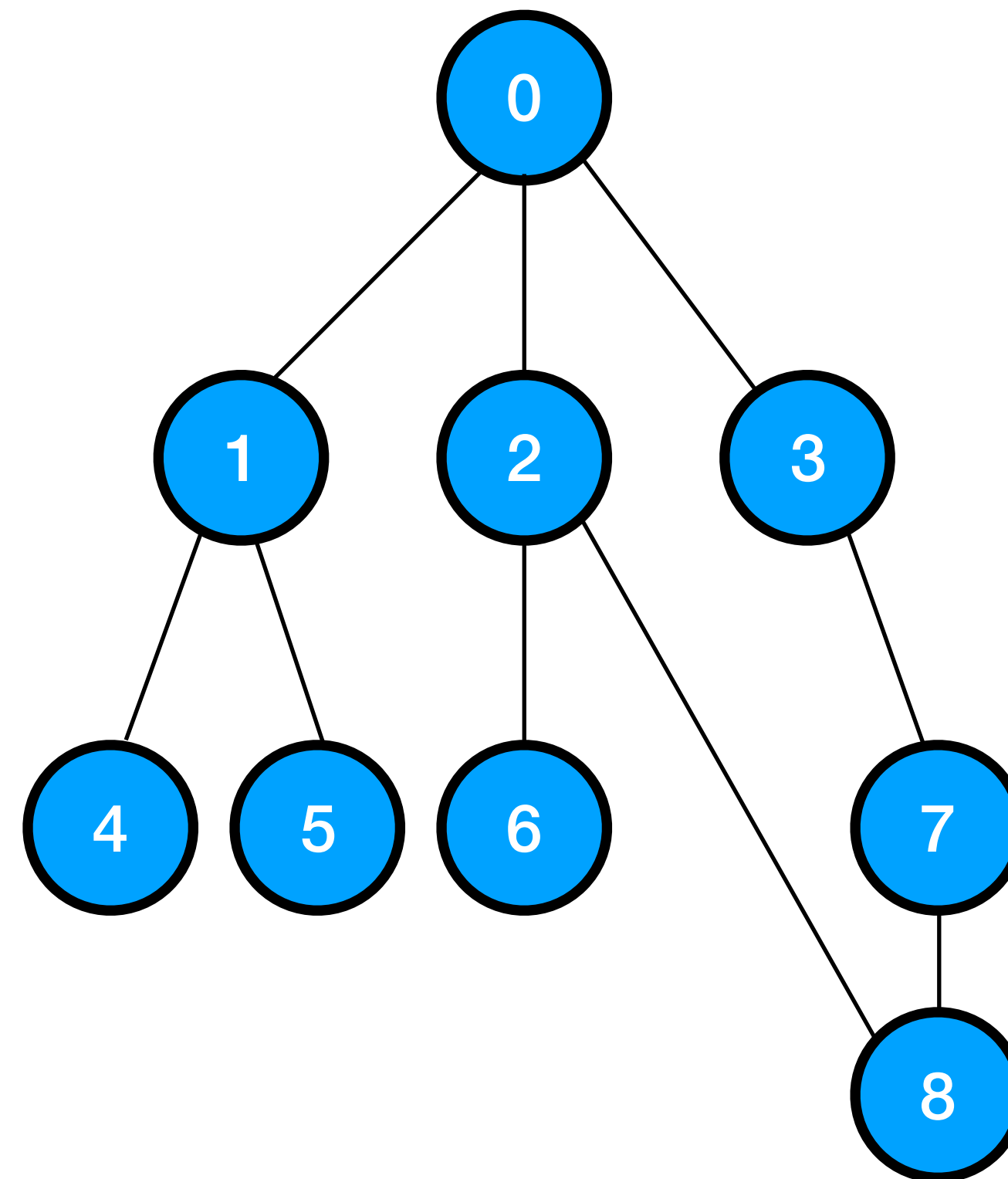
- Traverse into children before sibling/ neighboring.
- Implement using stack.



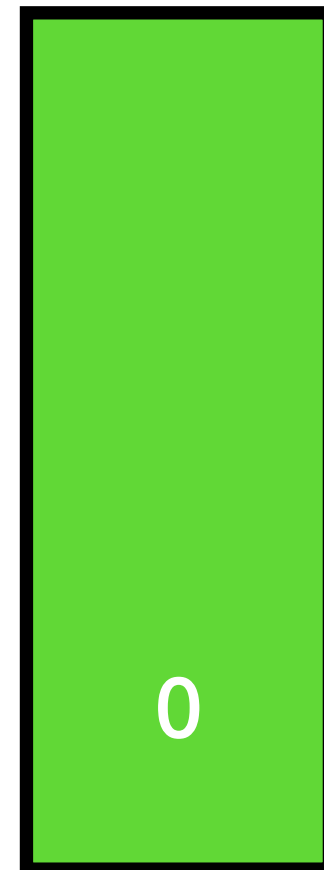
# Depth First Search (DFS)



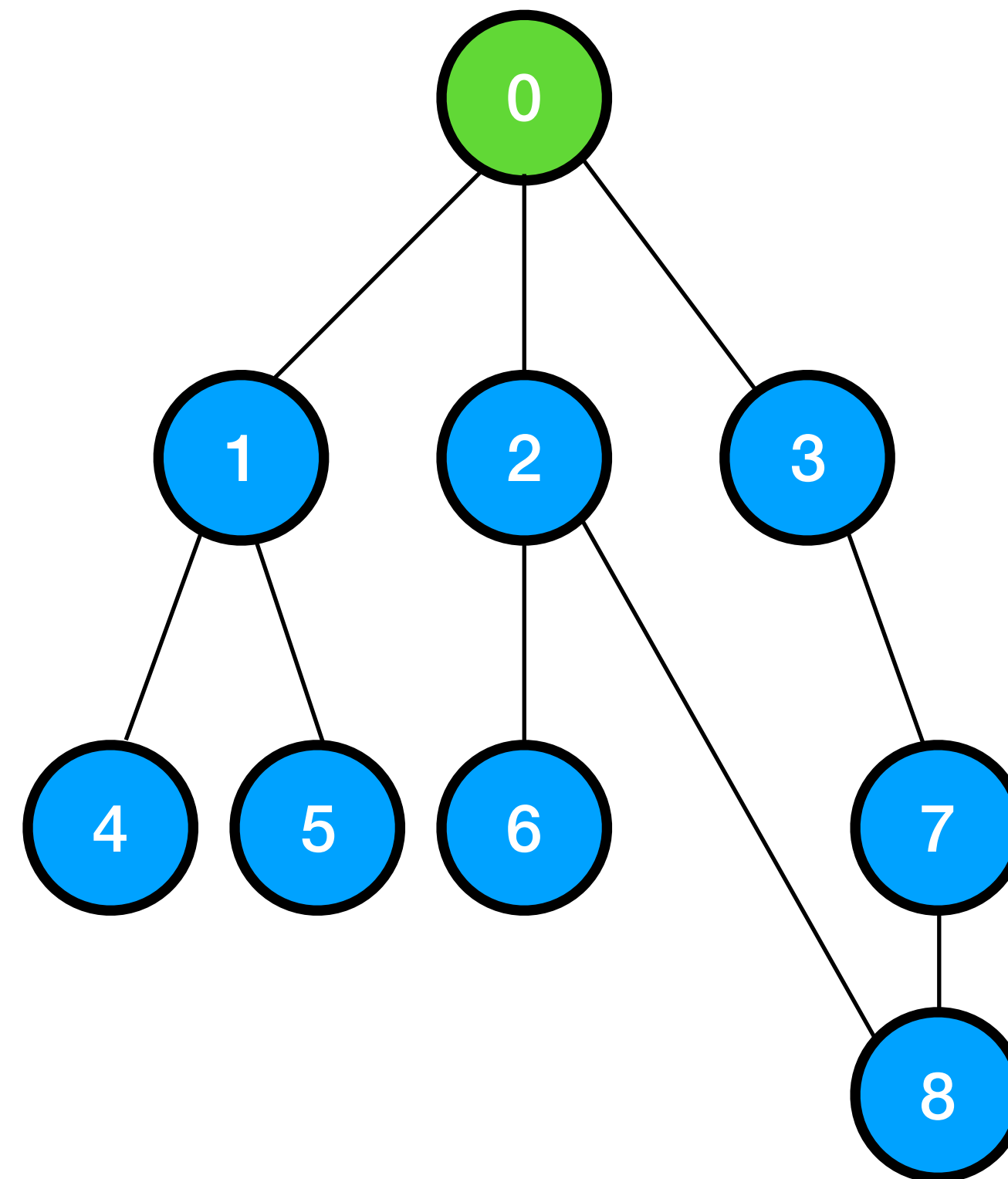
Search order :



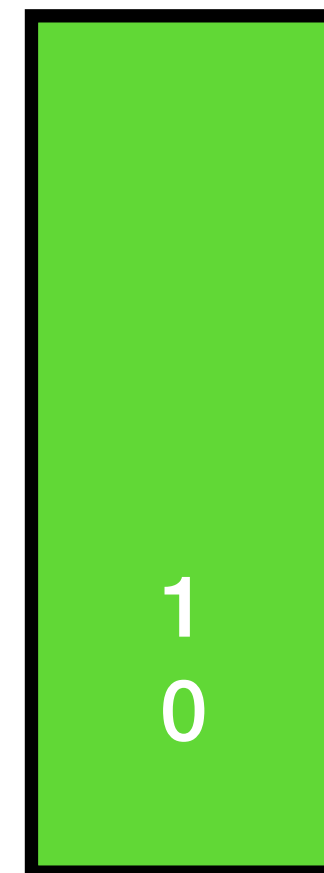
# Depth First Search (DFS)



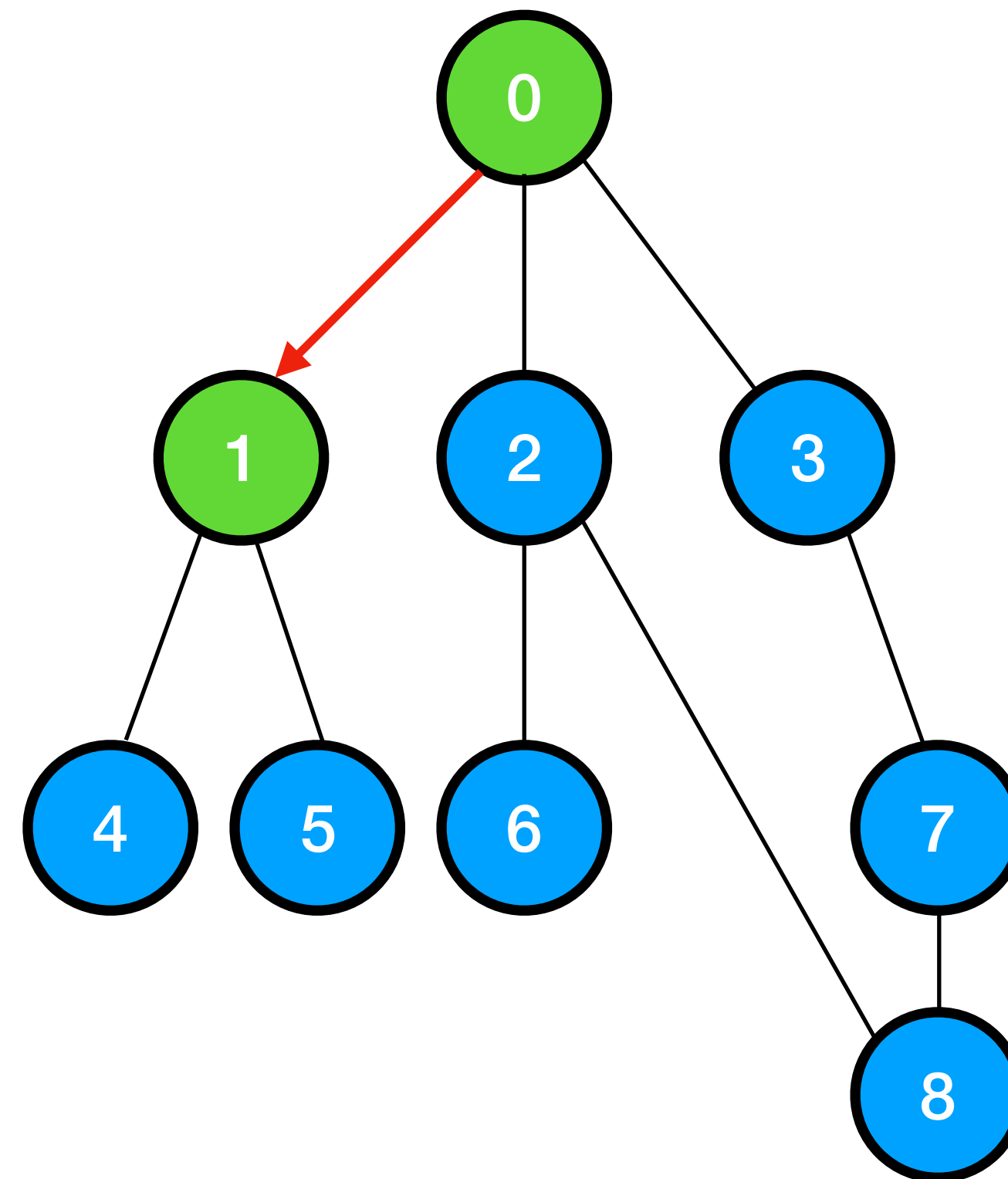
Search order : 0



# Depth First Search (DFS)

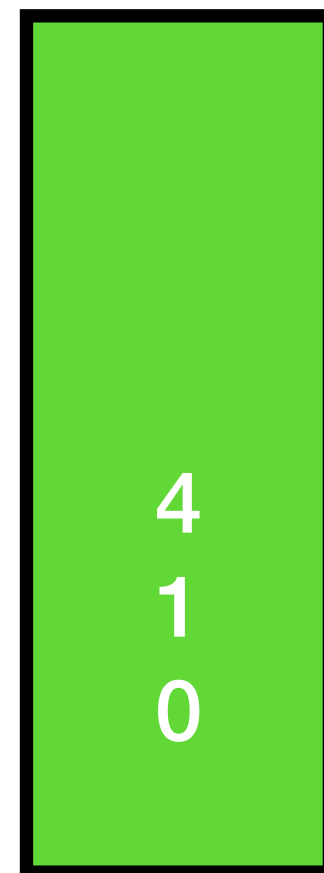


Search order : 0 1

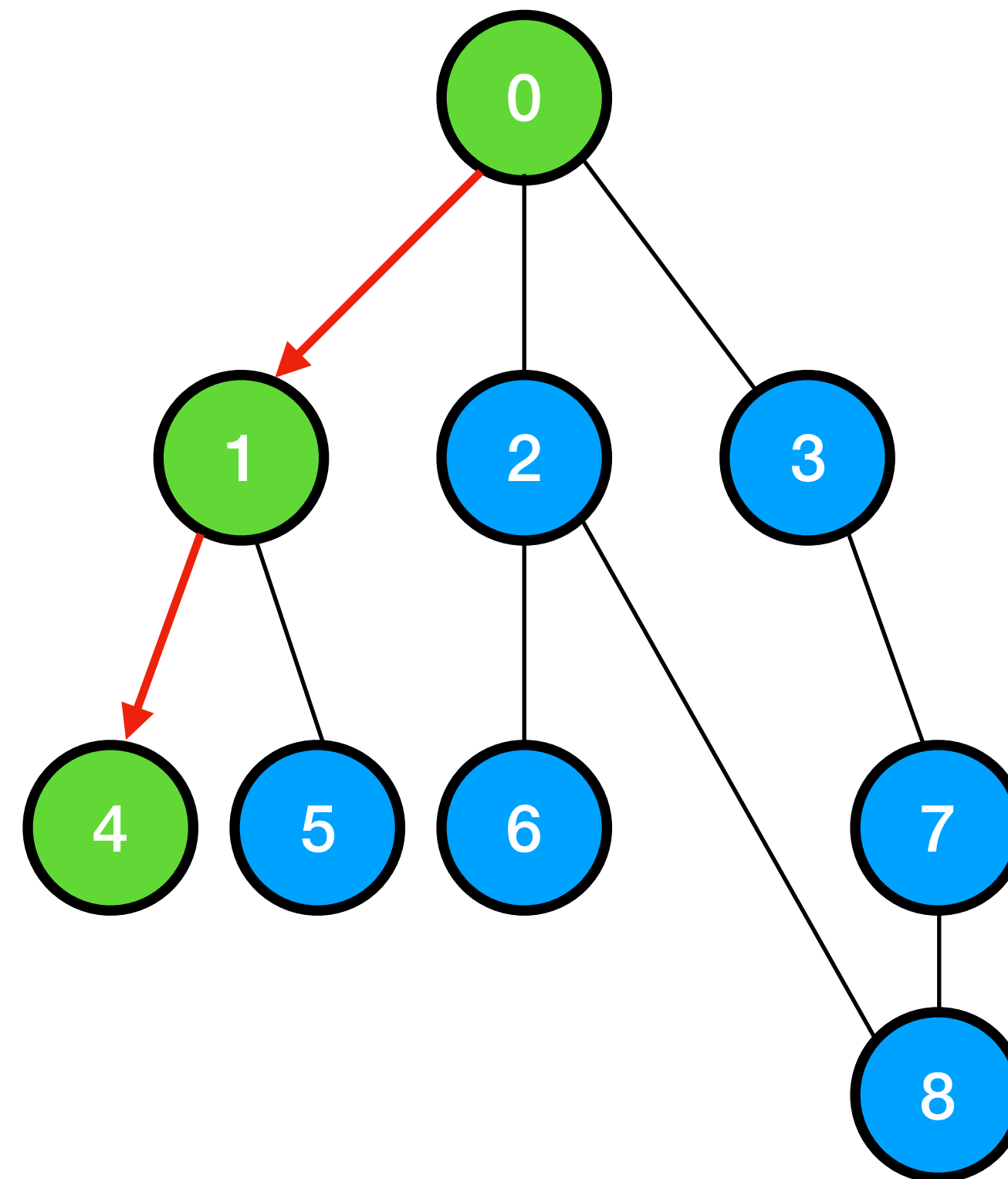




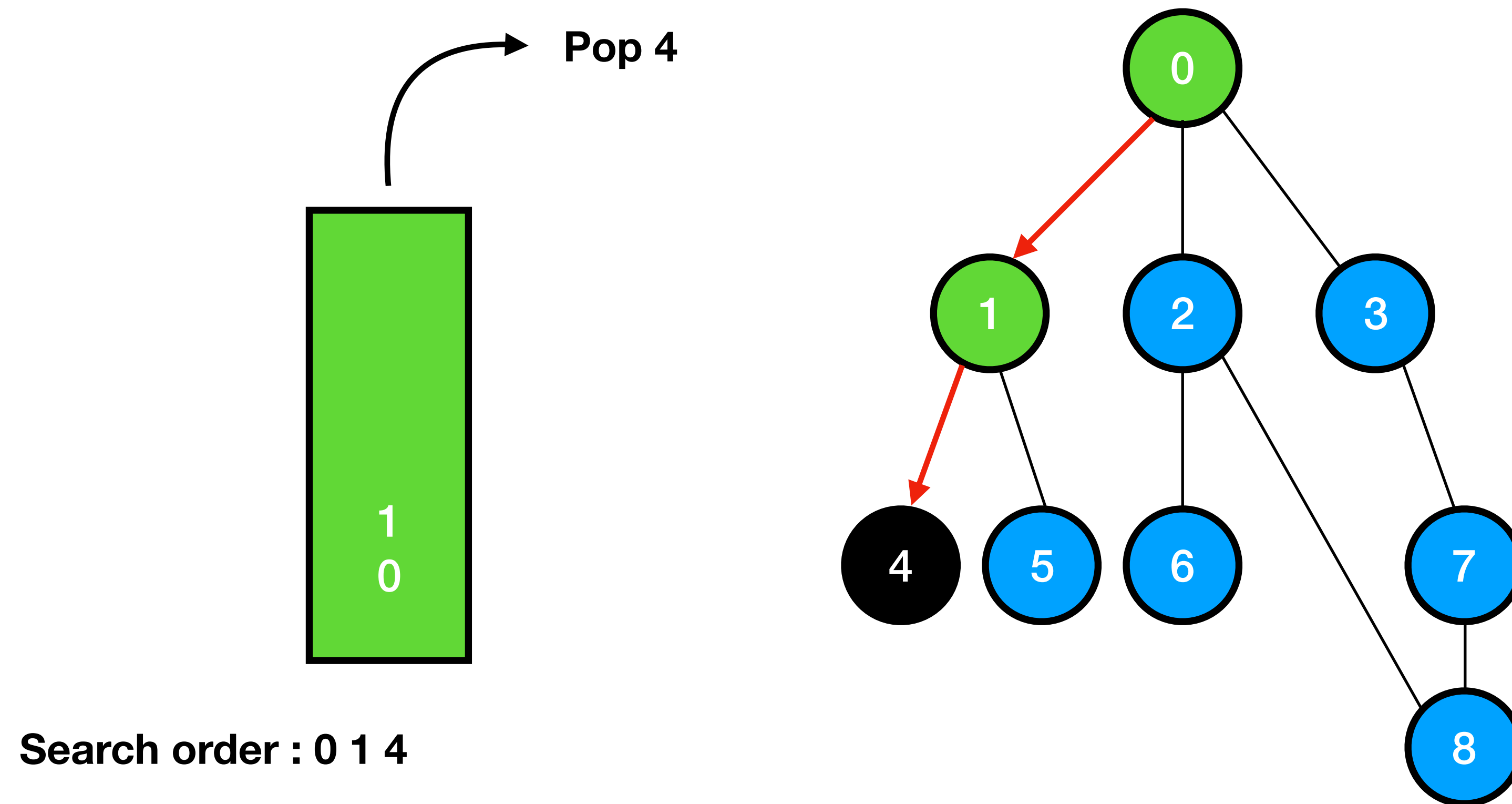
# Depth First Search (DFS)



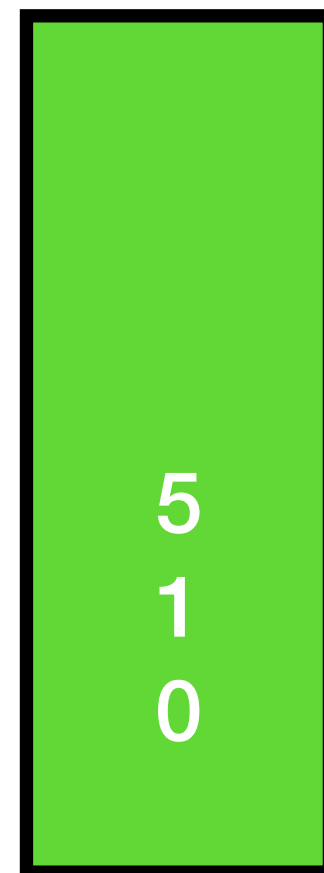
Search order : 0 1 4



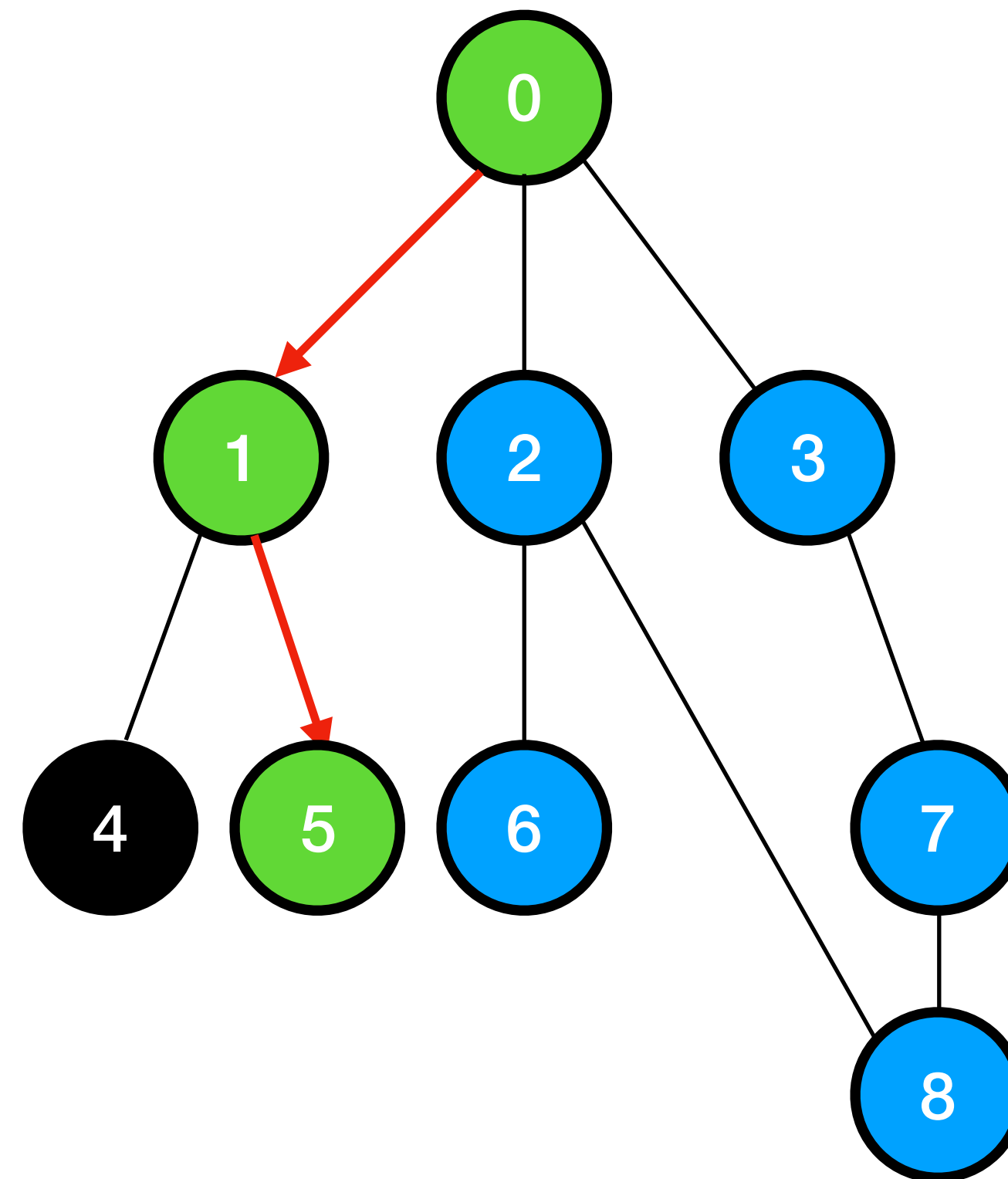
# Depth First Search (DFS)



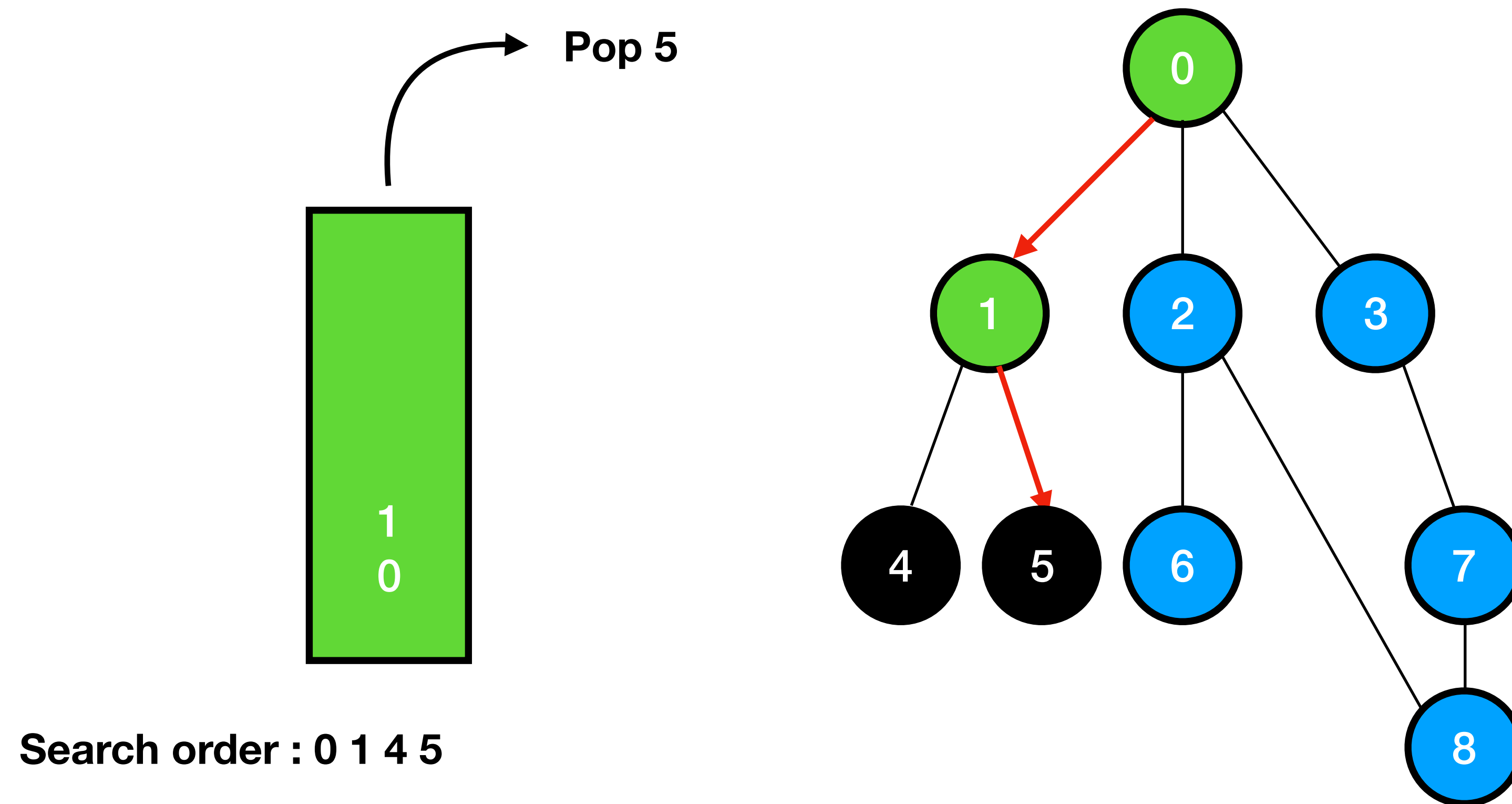
# Depth First Search (DFS)



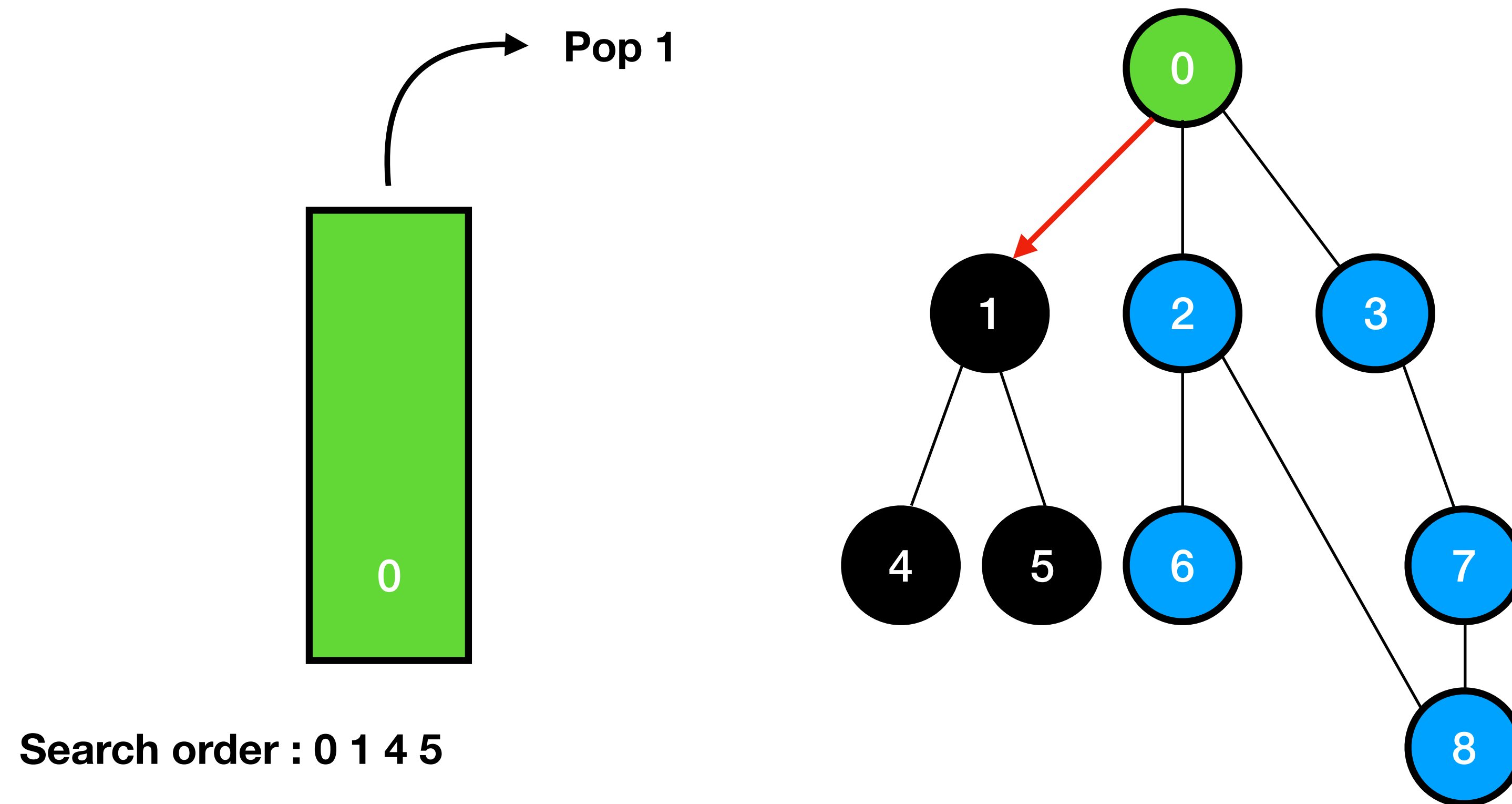
Search order : 0 1 4 5



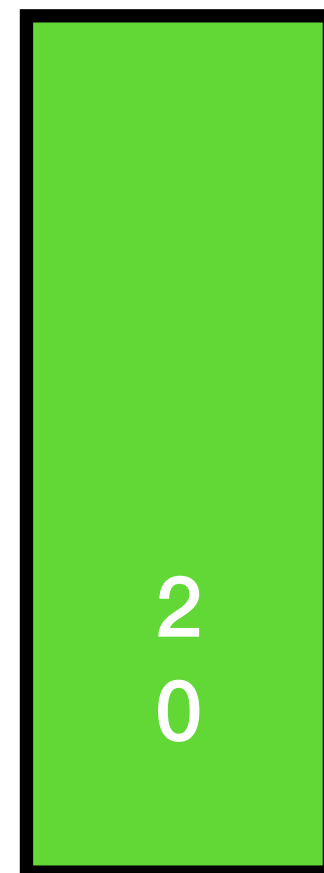
# Depth First Search (DFS)



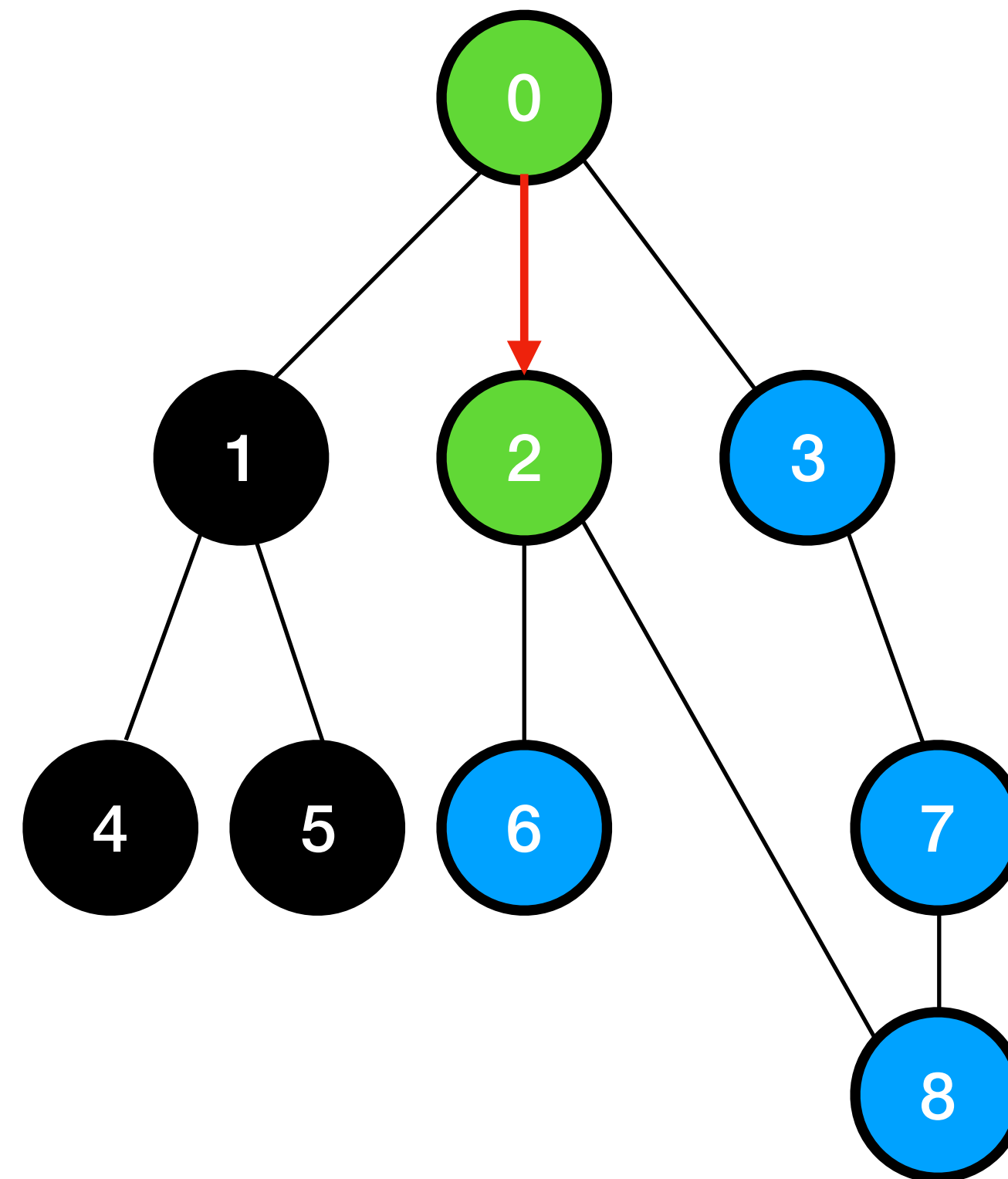
# Depth First Search (DFS)



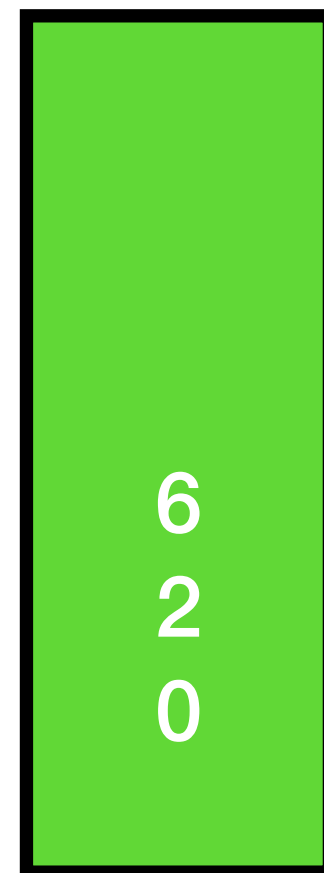
# Depth First Search (DFS)



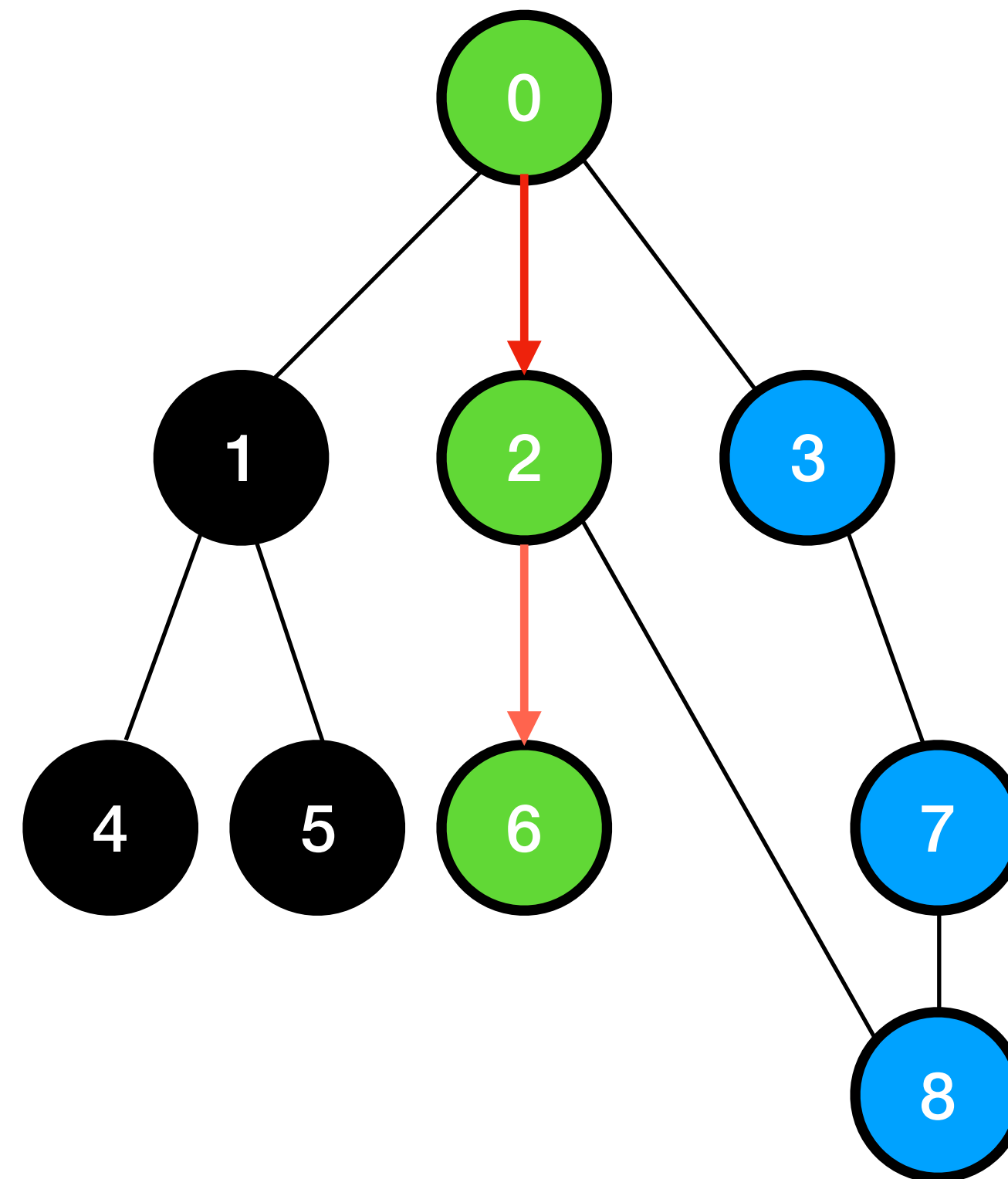
Search order : 0 1 4 5 2



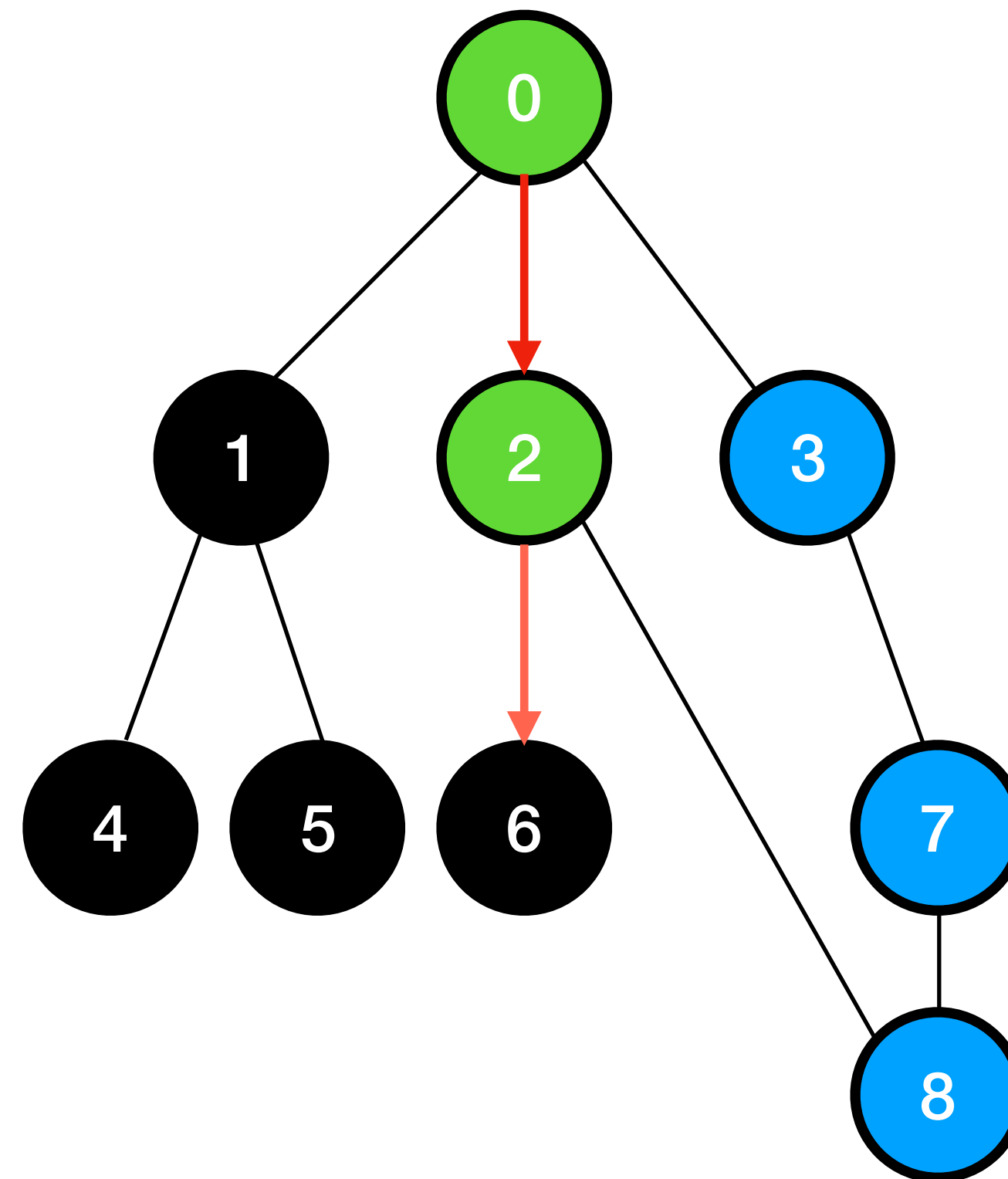
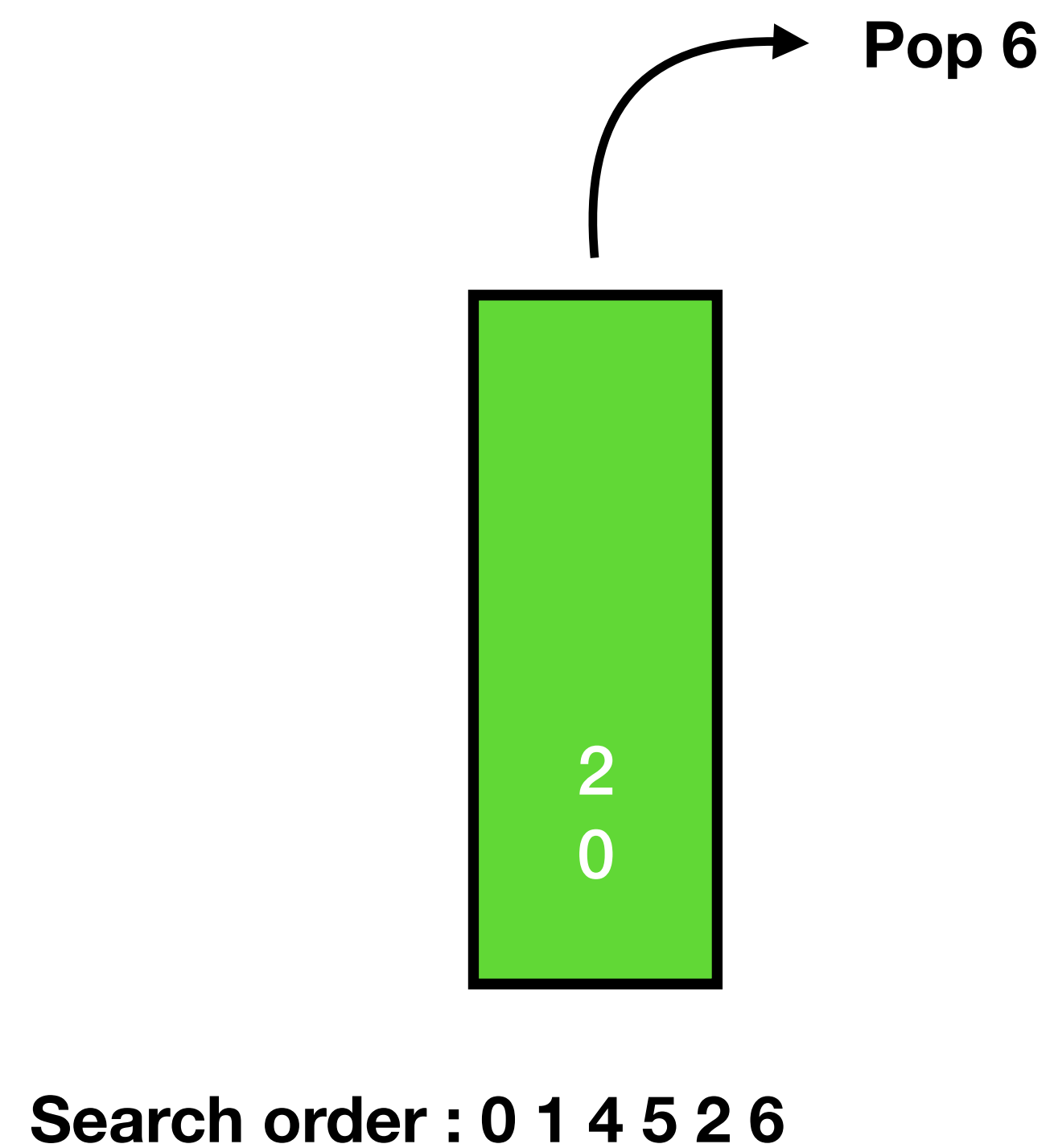
# Depth First Search (DFS)



Search order : 0 1 4 5 2 6

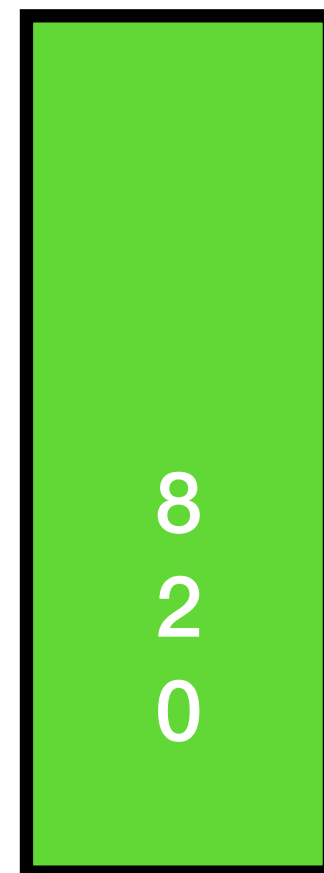


# Depth First Search (DFS)

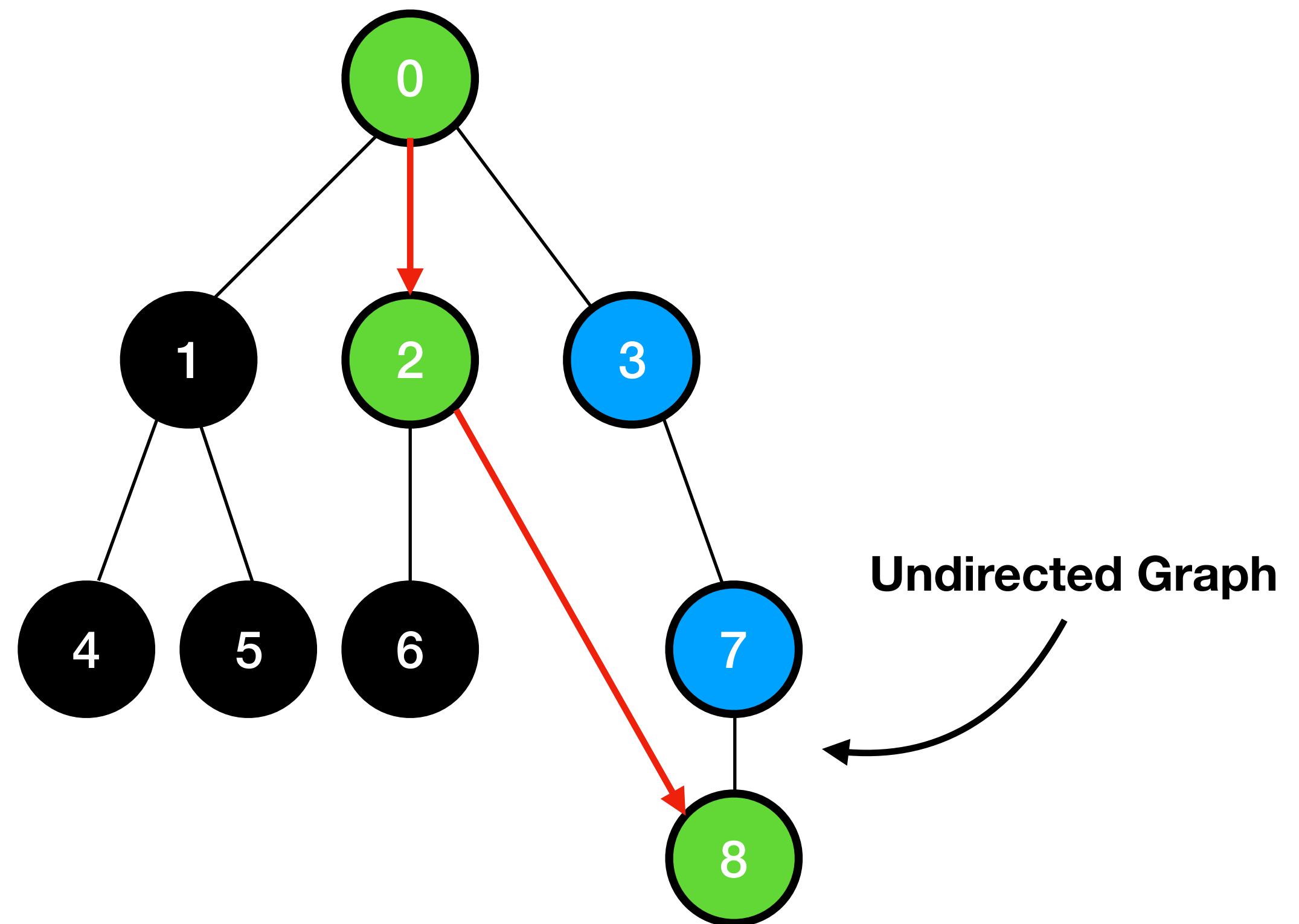




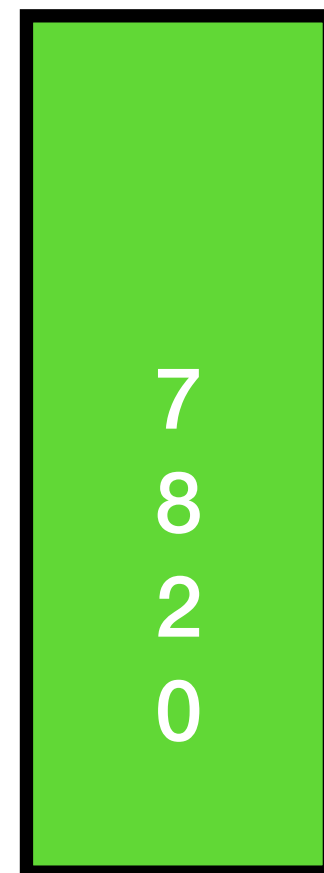
# Depth First Search (DFS)



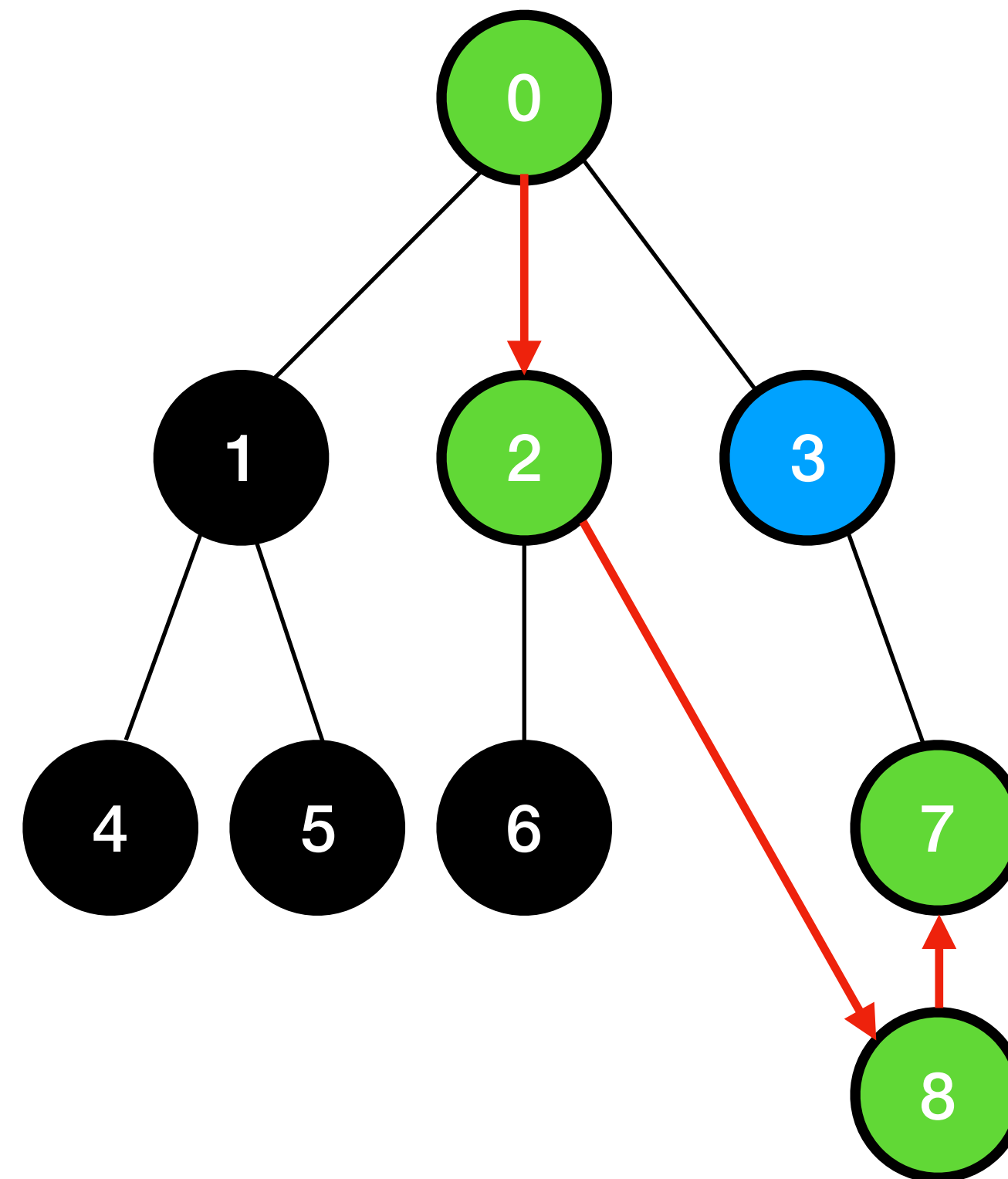
Search order : 0 1 4 5 2 6 8



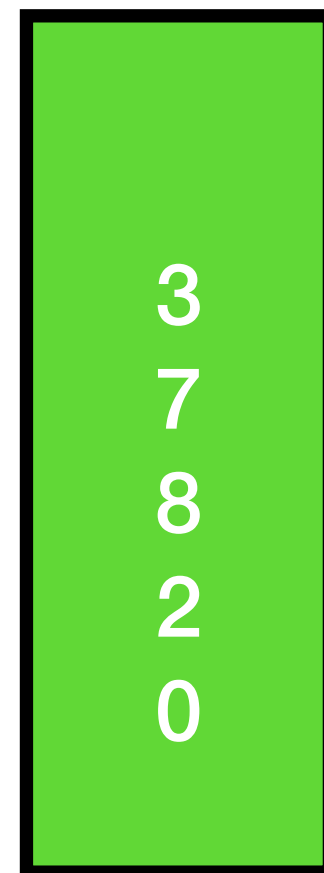
# Depth First Search (DFS)



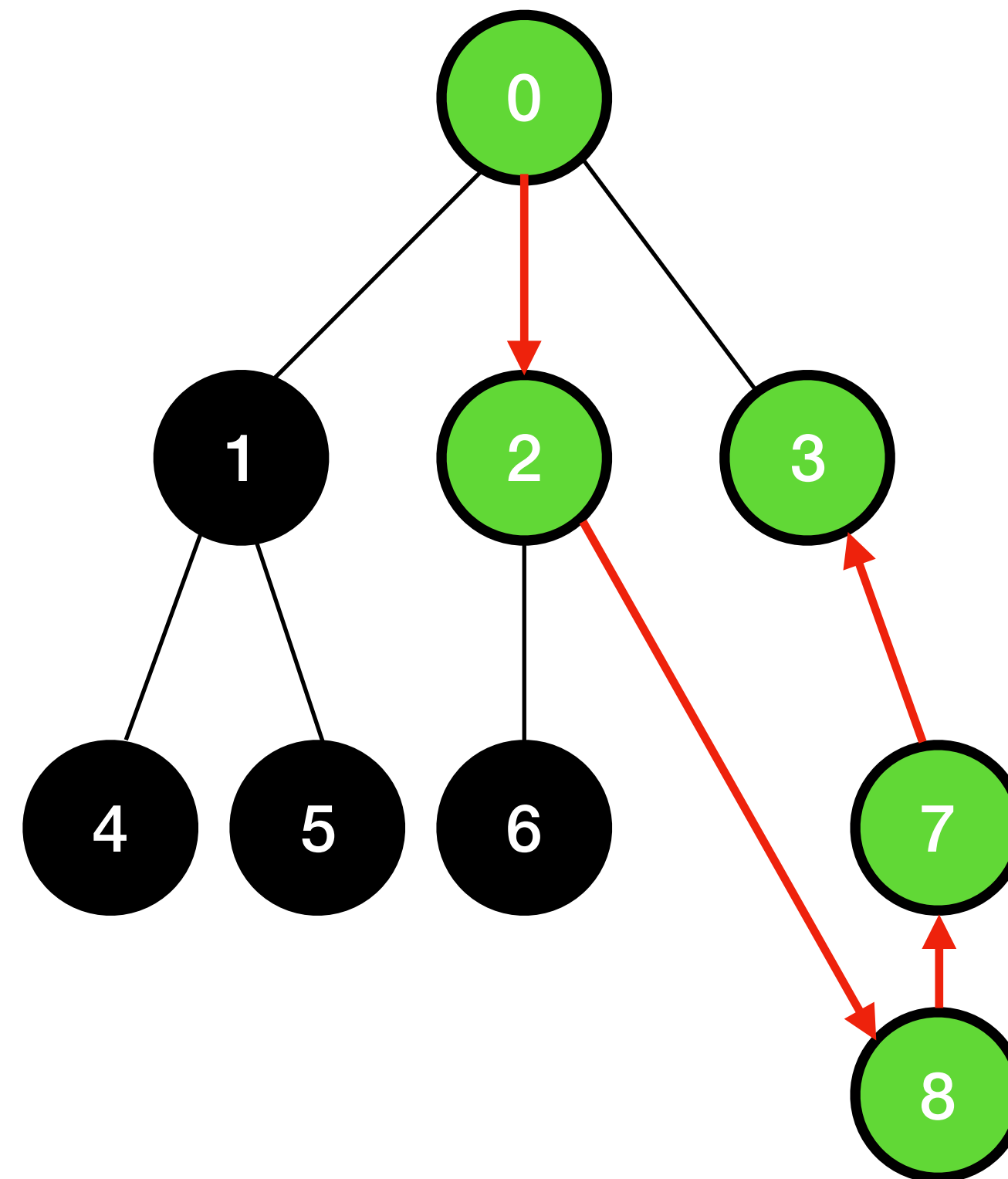
Search order : 0 1 4 5 2 6 8 7



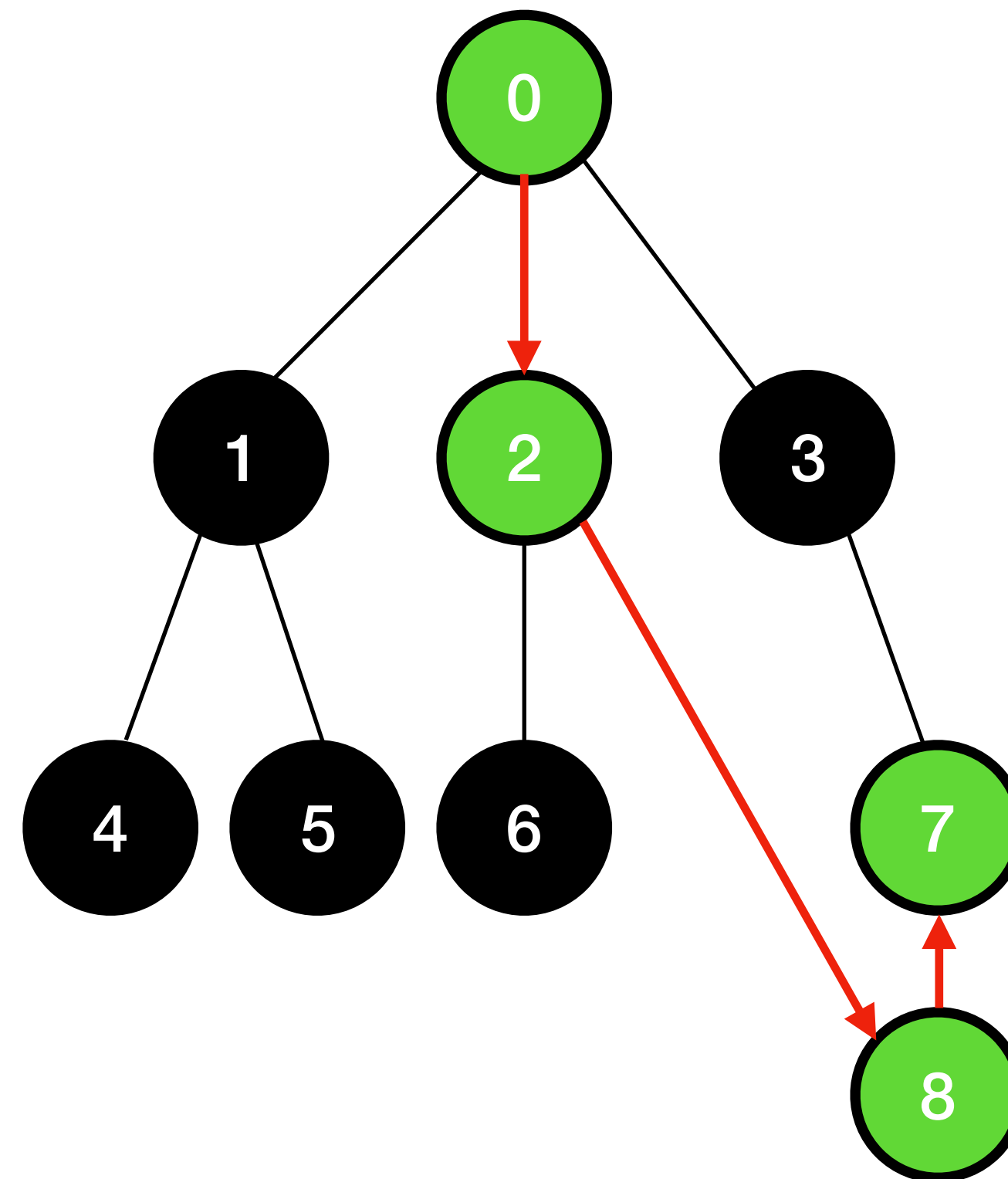
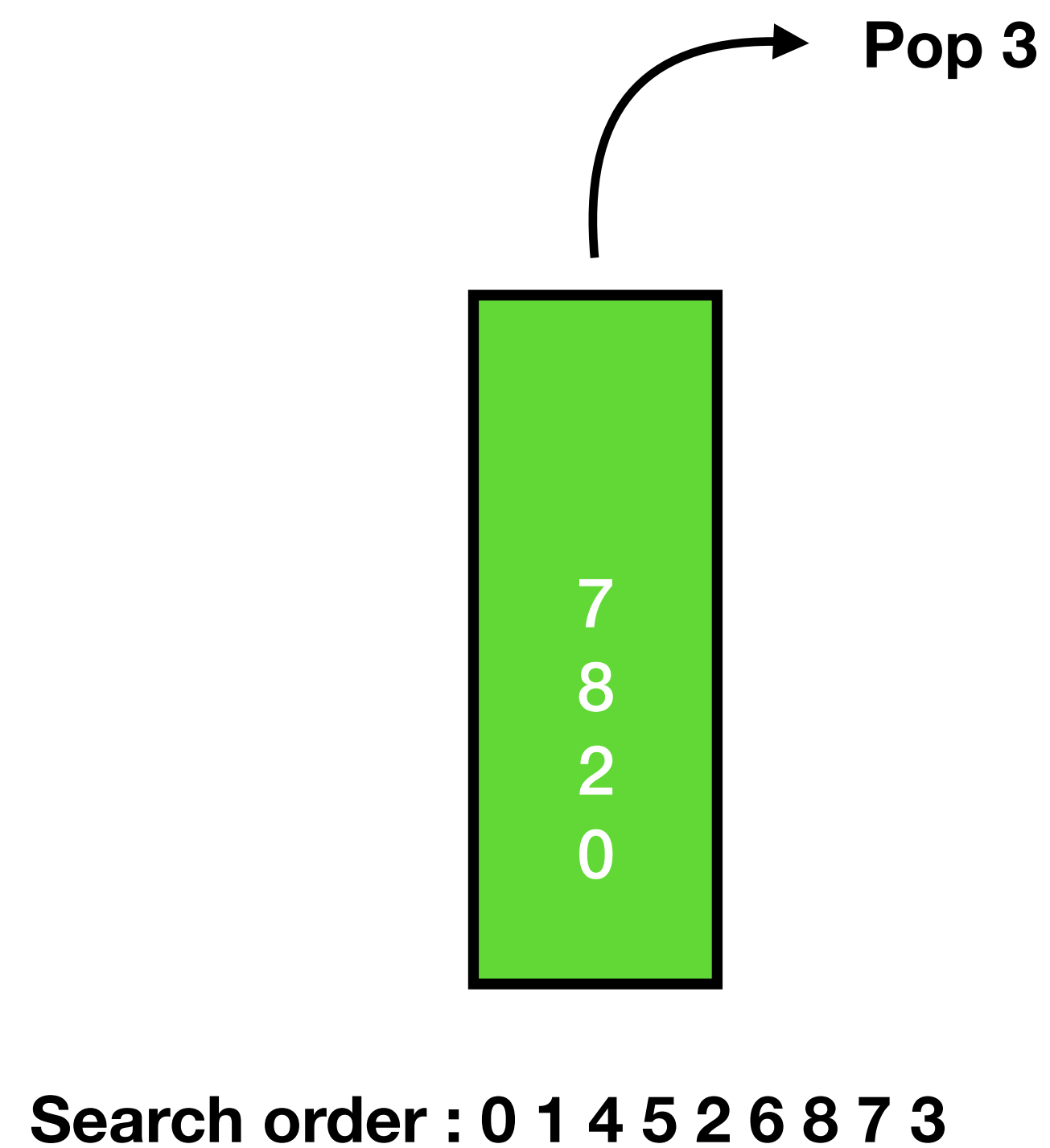
# Depth First Search (DFS)



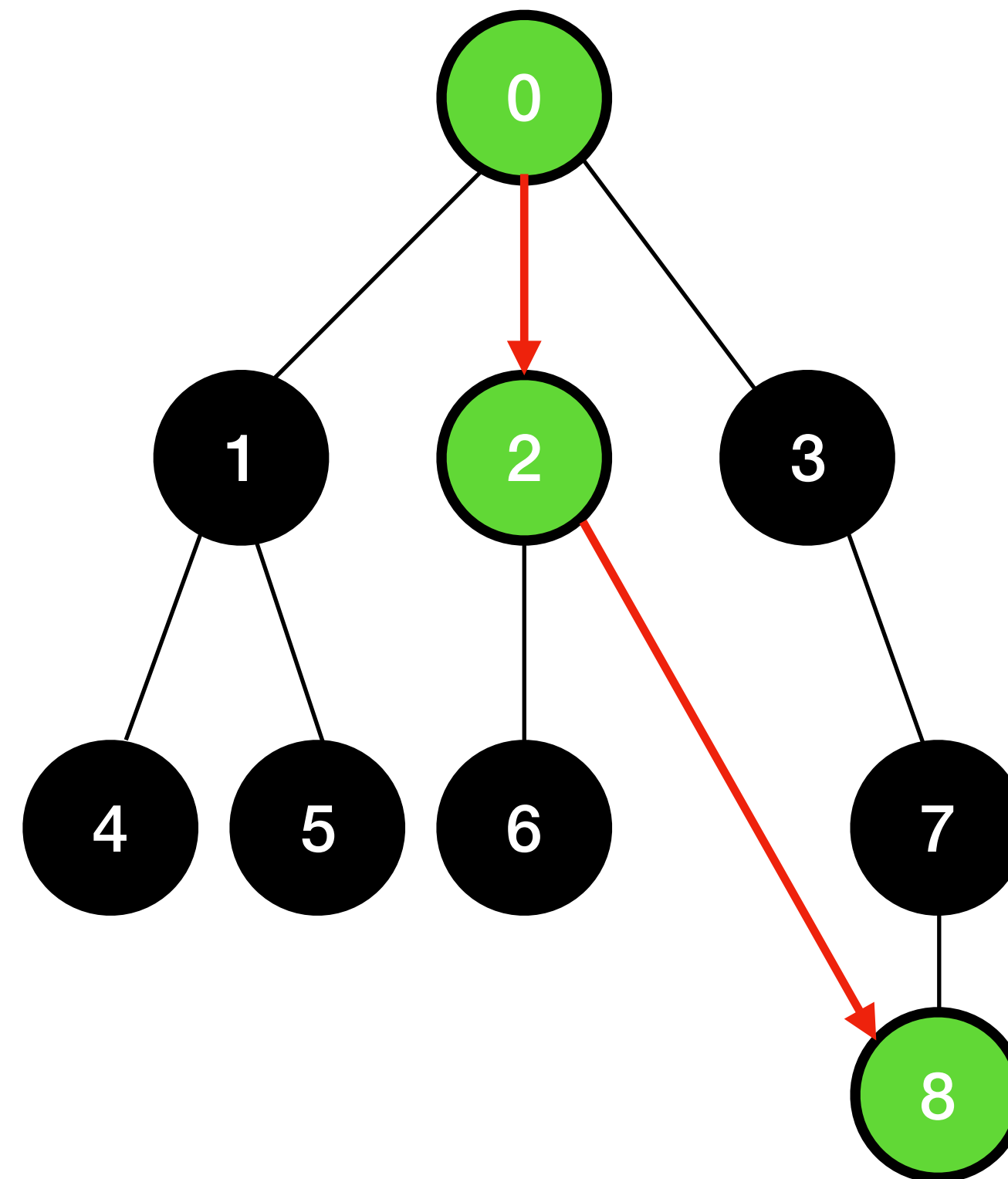
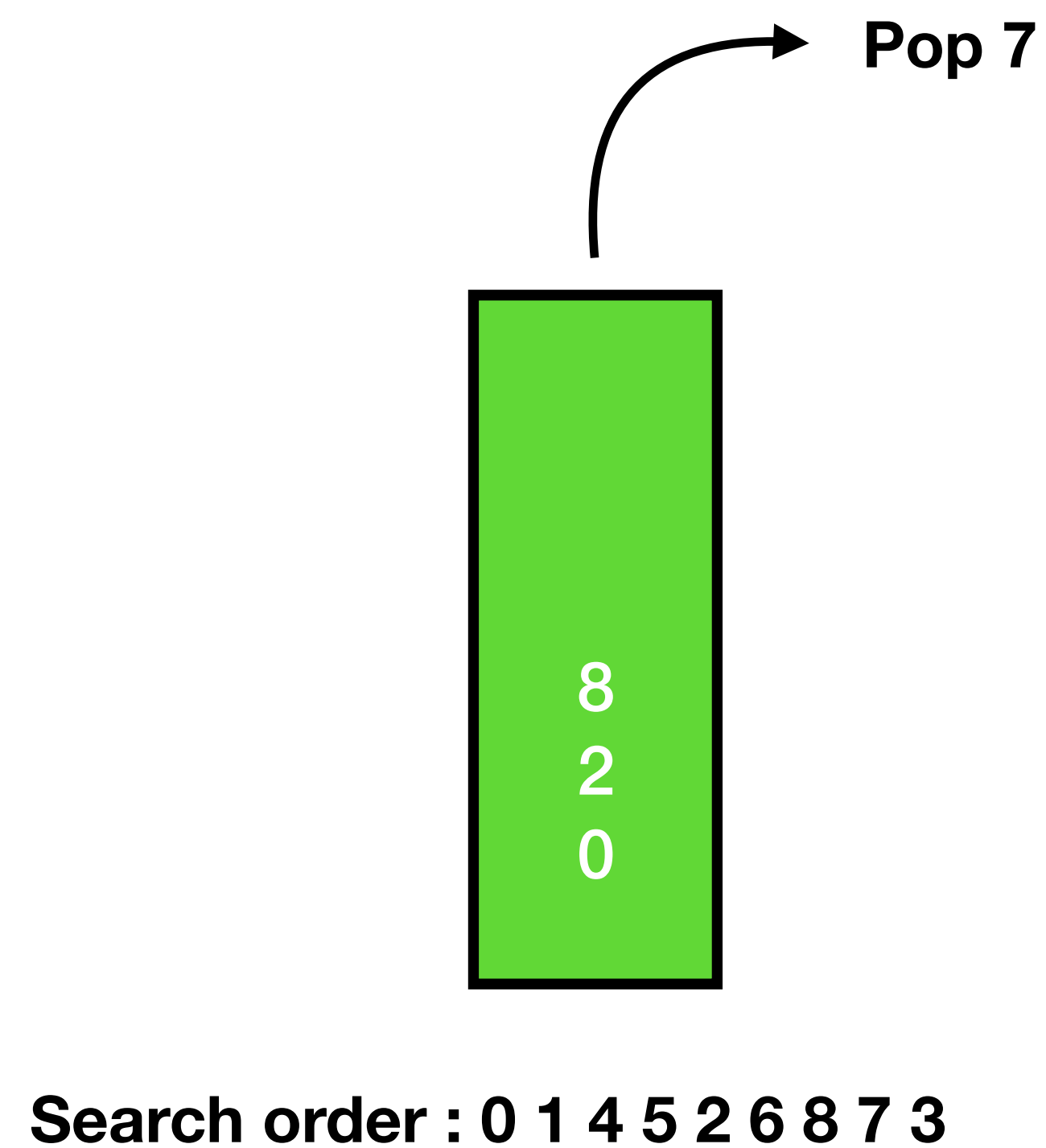
Search order : 0 1 4 5 2 6 8 7 3



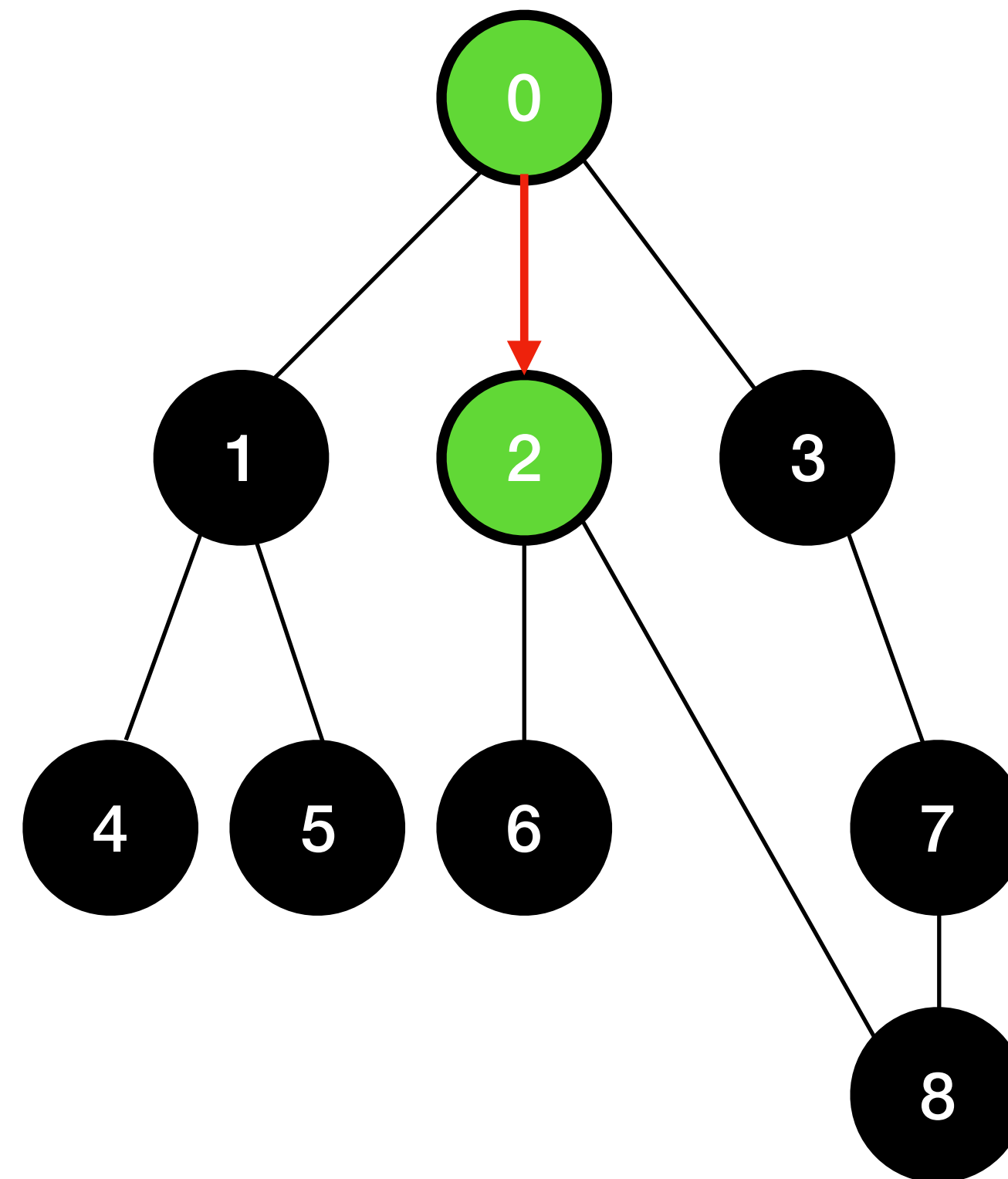
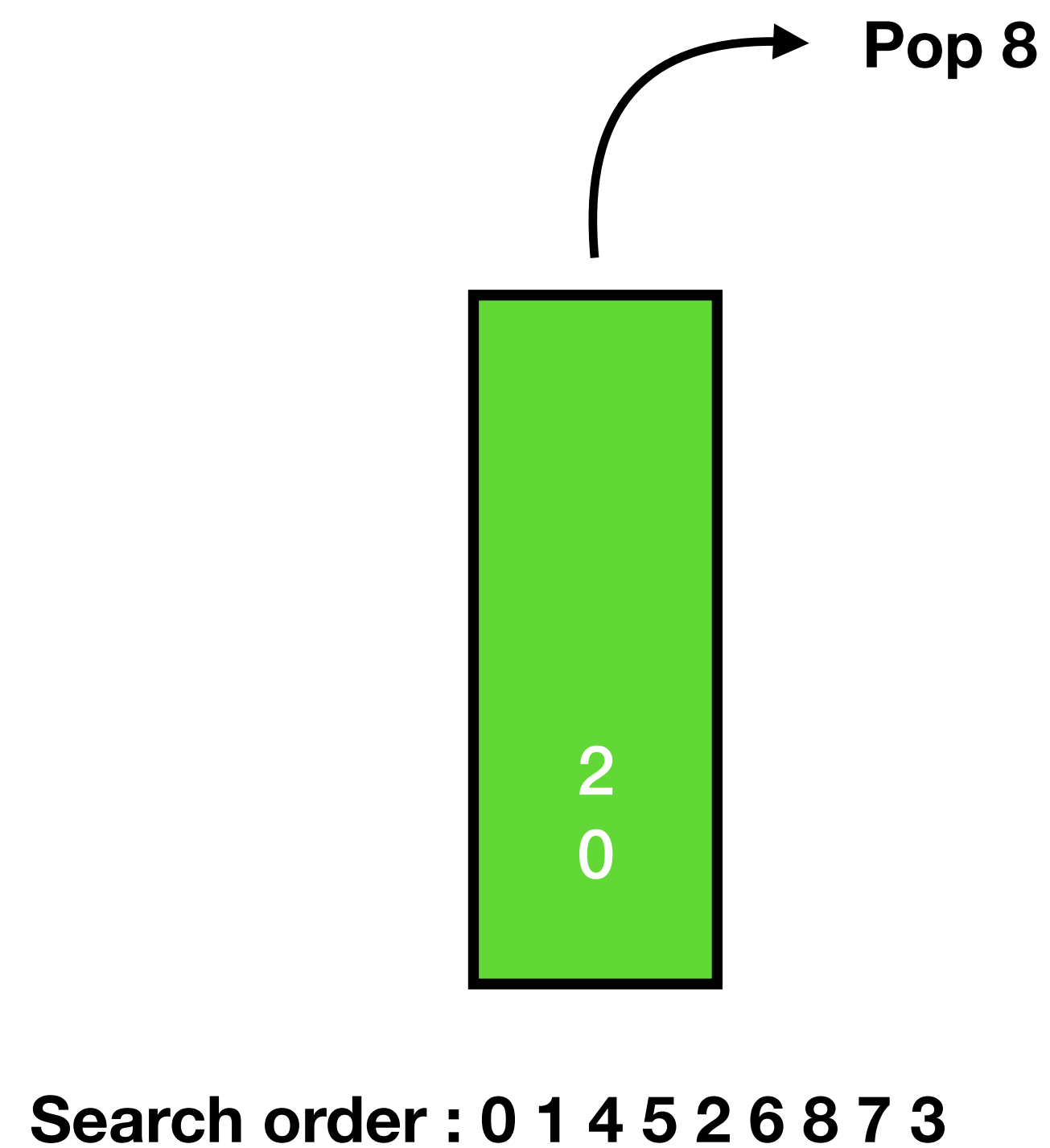
# Depth First Search (DFS)



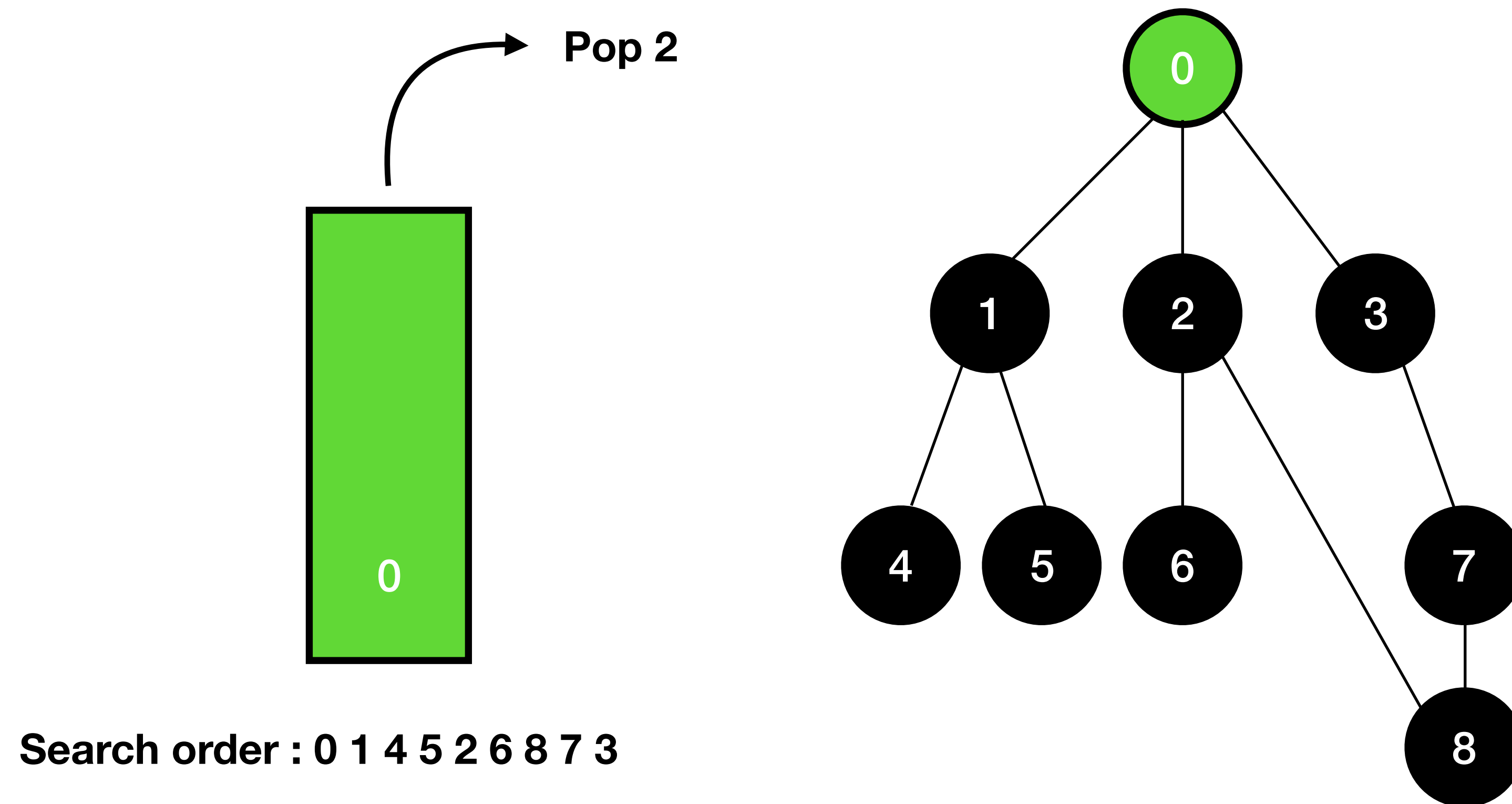
# Depth First Search (DFS)



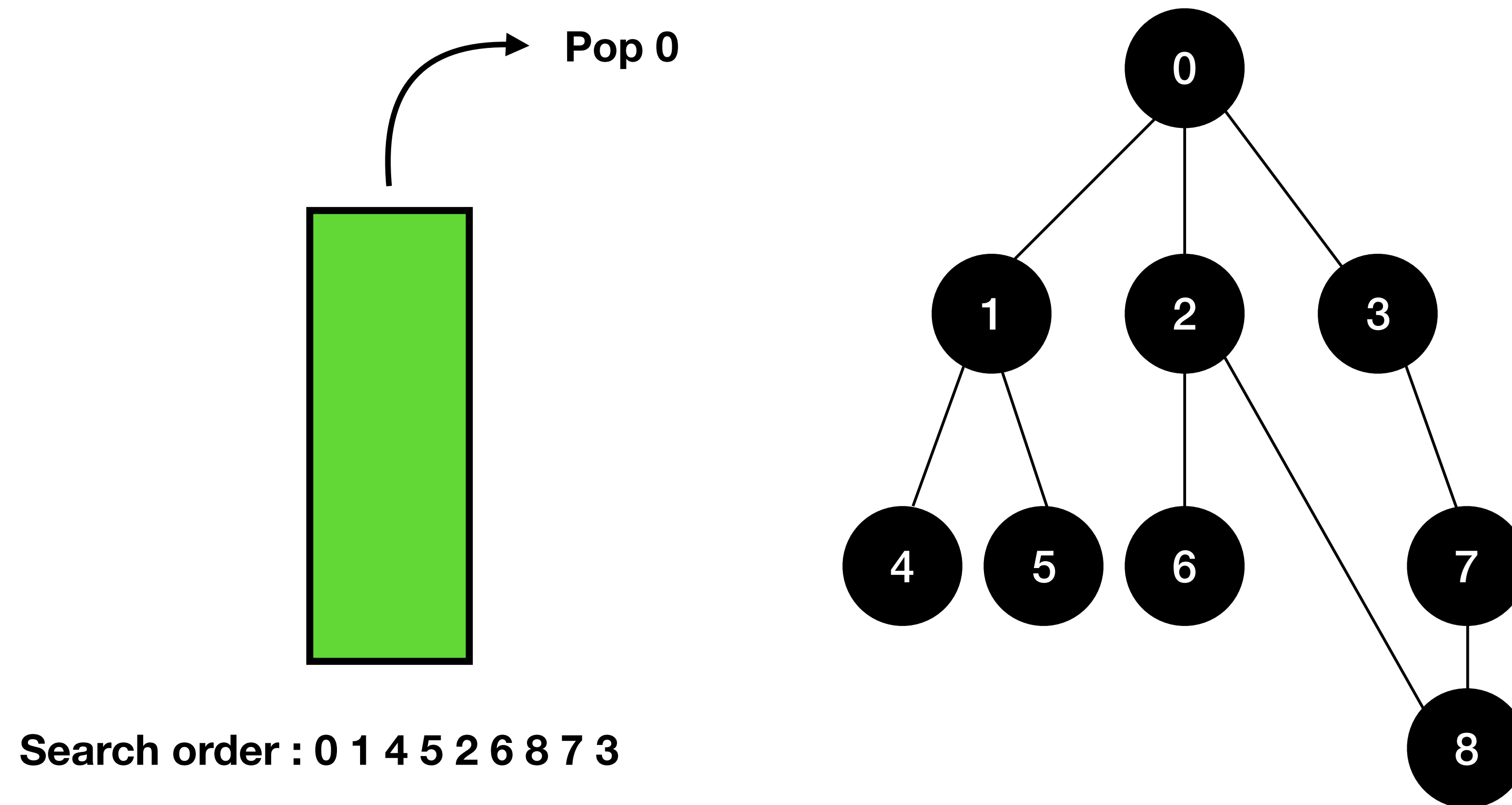
# Depth First Search (DFS)



# Depth First Search (DFS)



# Depth First Search (DFS)





# DFS Pseudocode

**dfs(startVertex)**

visitedVertices = []

dfsRecursive(startVertex, visitedVertices)

dfsRecursive(currentVertex, visitedVertices)

visitedVertices[currentVertex] = true

for children of currentVertex

if visitedVertices[children] == false

dfsRecursive(children, visitedVertices)

# DFS Pseudocode

```
dfs(startVertex)
```

```
    visitedVertices = []
```

```
    dfsRecursive(startVertex, visitedVertices)
```

```
dfsRecursive(currentVertex, visitedVertices)
```

```
    visitedVertices[currentVertex] = true
```

```
    for children of currentVertex
```

```
        if visitedVertices[children] == false
```

```
            dfsRecursive(children, visitedVertices)
```

# DFS Pseudocode

```
dfs(startVertex)
  visitedVertices = []
  dfsRecursive(startVertex, visitedVertices)
```

```
dfsRecursive(currentVertex, visitedVertices)
  visitedVertices[currentVertex] = true
```

```
  for children of currentVertex
    if visitedVertices[children] == false
      dfsRecursive(children, visitedVertices)
```

# DFS Pseudocode

```
dfs(startVertex)  
  visitedVertices = []  
  dfsRecursive(startVertex, visitedVertices)
```

```
dfsRecursive(currentVertex, visitedVertices)  
  visitedVertices[currentVertex] = true
```

```
  for children of currentVertex  
    if visitedVertices[children] == false  
      dfsRecursive(children, visitedVertices)
```

# DFS Pseudocode

```
dfs(startVertex)  
    visitedVertices = []  
    dfsRecursive(startVertex, visitedVertices)
```

```
dfsRecursive(currentVertex, visitedVertices)  
    currentVertex.visited = true
```

```
    for children of currentVertex  
        if visitedVertices[children] == false  
            dfsRecursive(children, visitedVertices)
```