



<http://algs4.cs.princeton.edu>

## 4.2 DIRECTED BFS DEMO

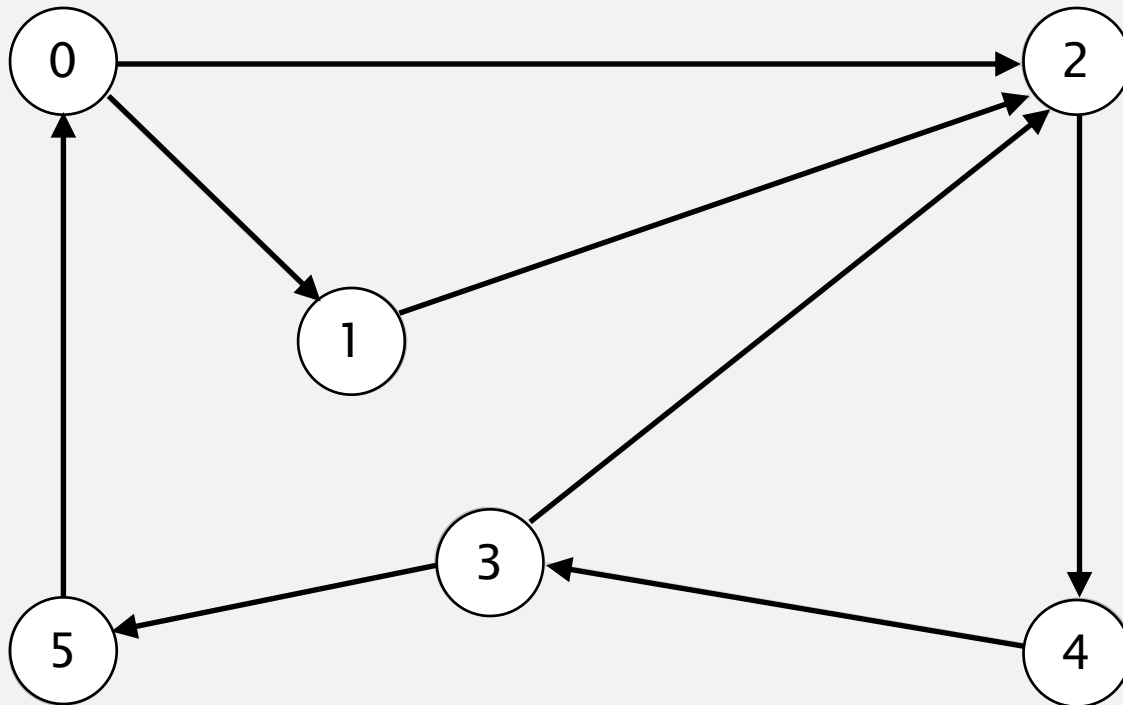
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# Directed breadth-first search demo

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Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



**tinyDG2.txt**

V → 6

8 ← E

5 0

2 4

3 2

1 2

0 1

4 3

3 5

0 2

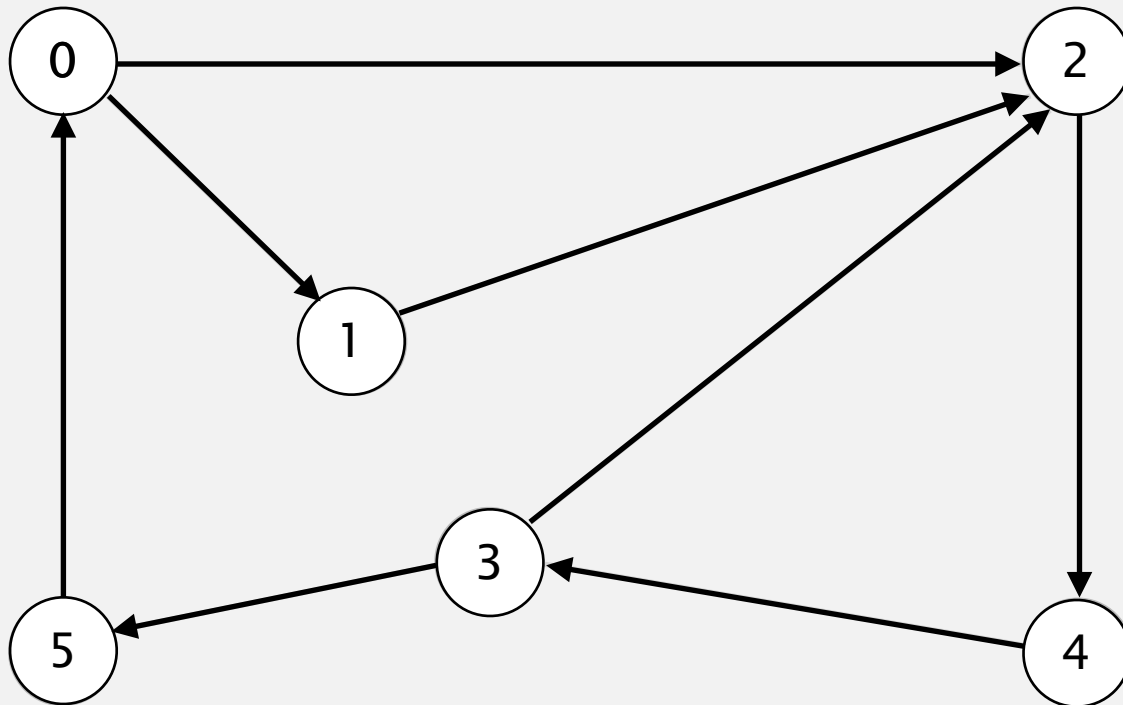
**graph G**

# Directed breadth-first search demo

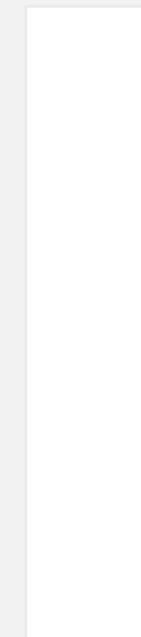
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



$v$	edgeTo[]	distTo[]
0	-	0
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-

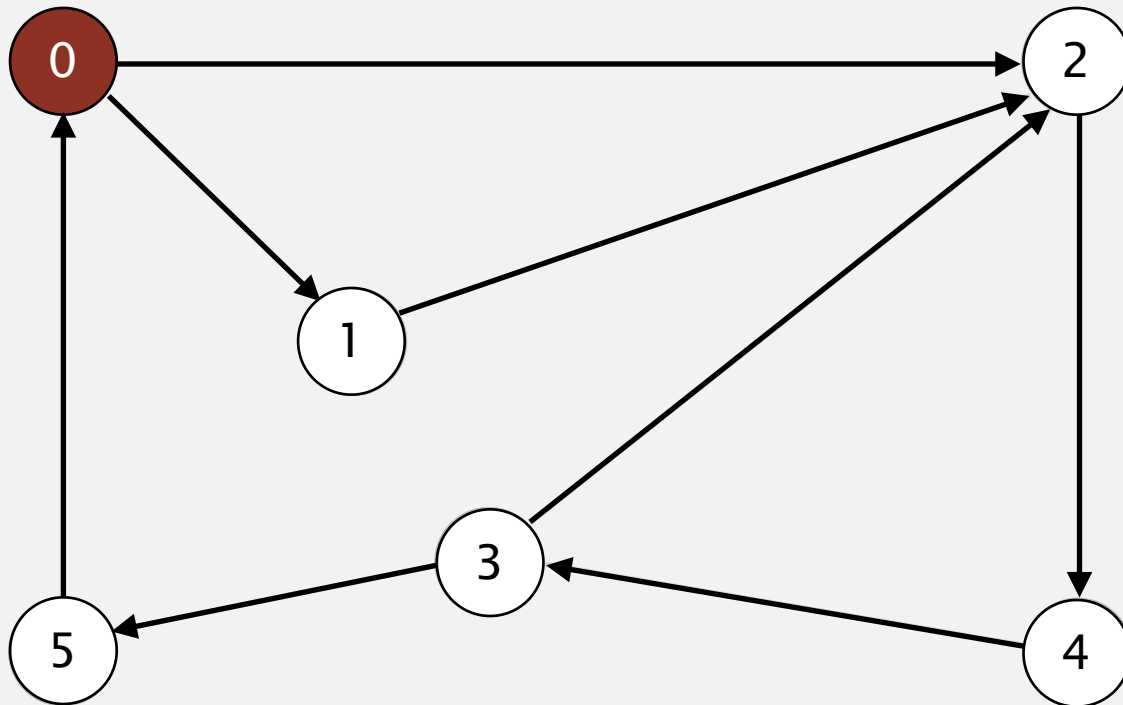
**add 0 to queue**

# Directed breadth-first search demo

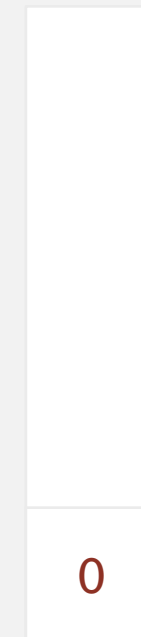
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



v	edgeTo[]	distTo[]
0	-	0
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-

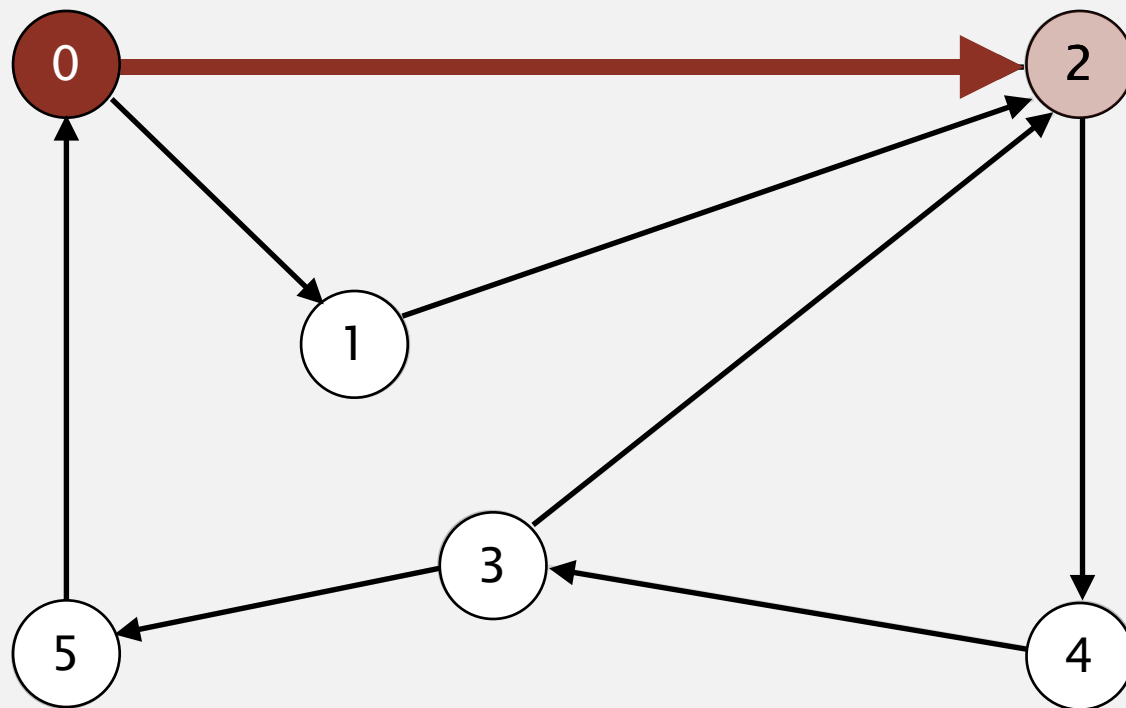
dequeue 0

# Directed breadth-first search demo

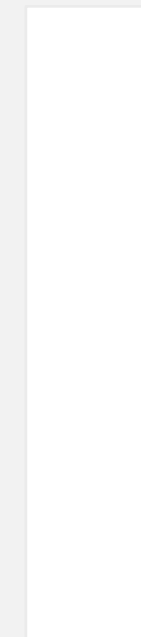
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



$v$	edgeTo[]	distTo[]
0	-	0
1	-	-
2	0	1
3	-	-
4	-	-
5	-	-

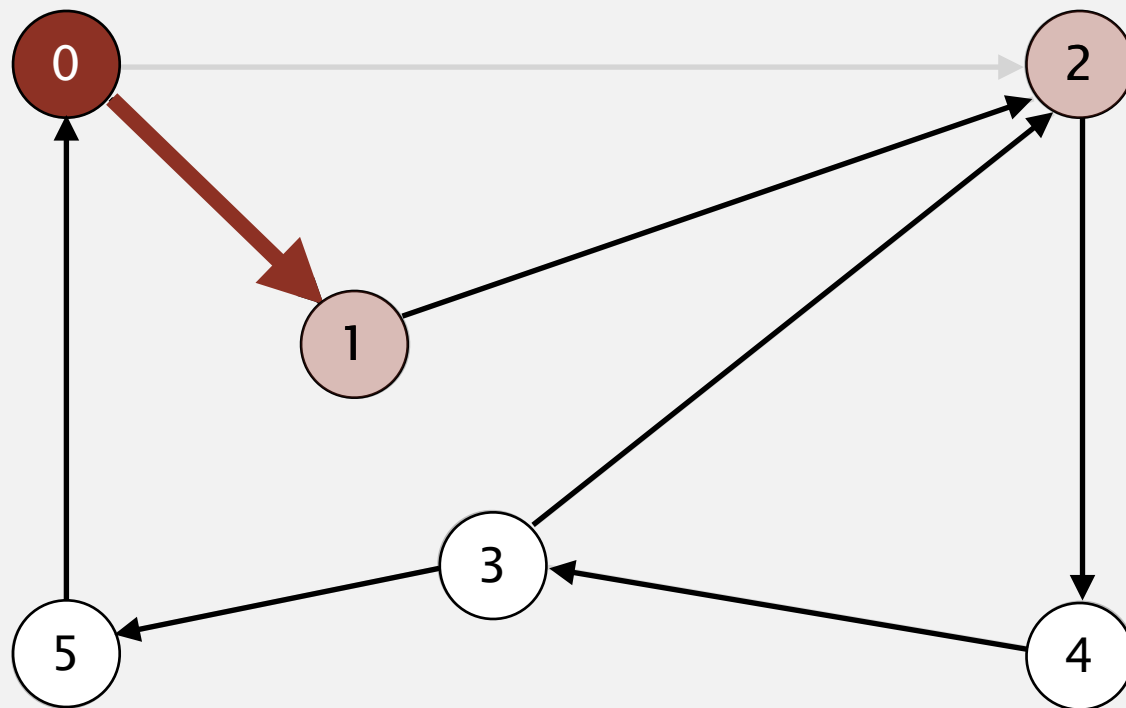
**dequeue 0: check 2** and check 1

# Directed breadth-first search demo

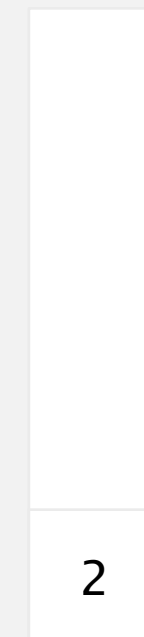
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



$v$	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	-	-
4	-	-
5	-	-

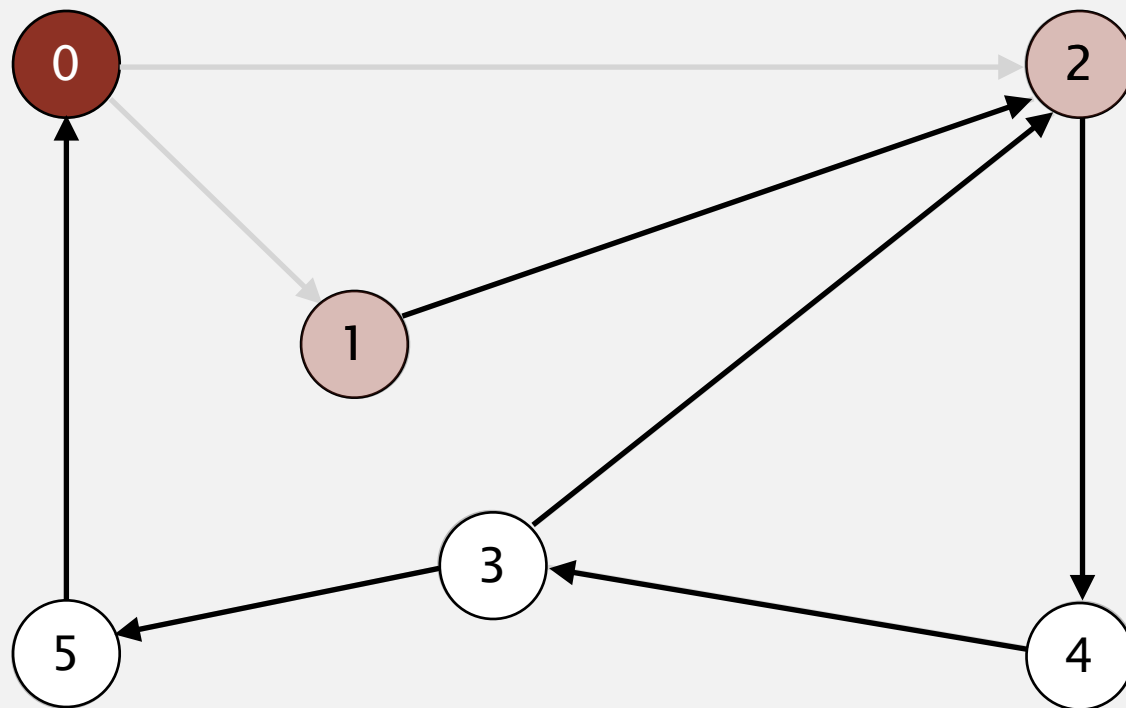
**dequeue 0:** check 2 and **check 1**

# Directed breadth-first search demo

---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue

1
2

v	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	-	-
4	-	-
5	-	-

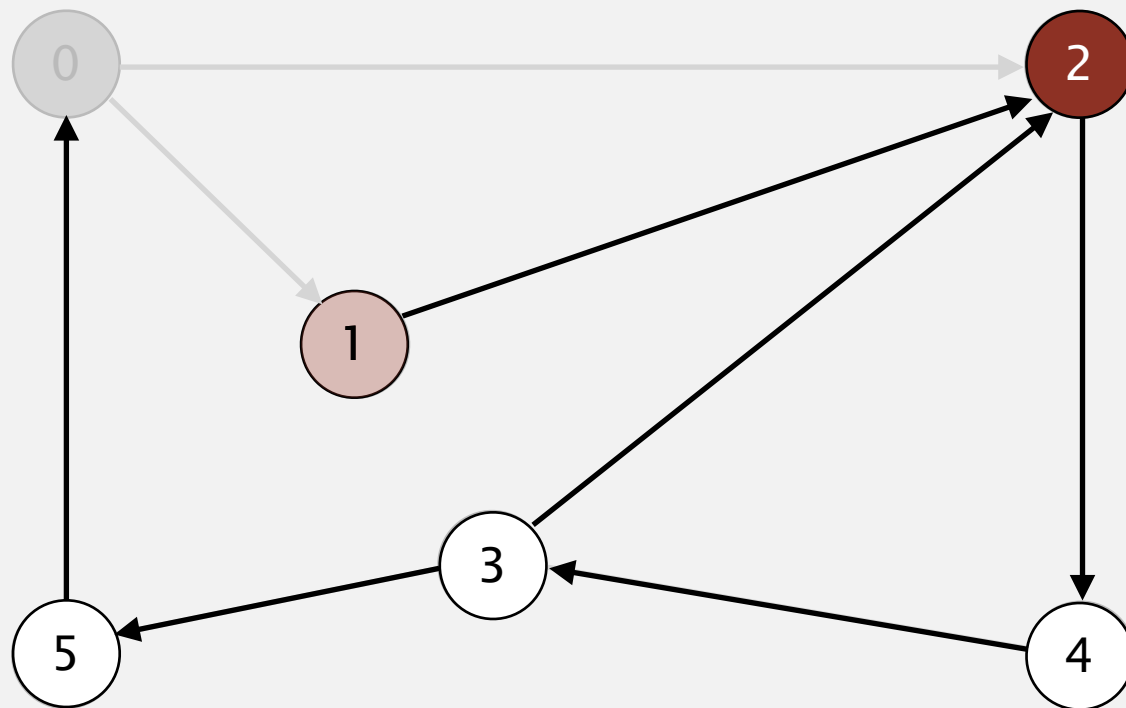
**0 done**

# Directed breadth-first search demo

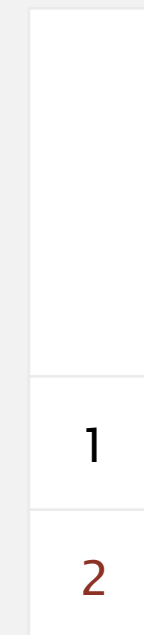
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



v	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	-	-
4	-	-
5	-	-

dequeue 2

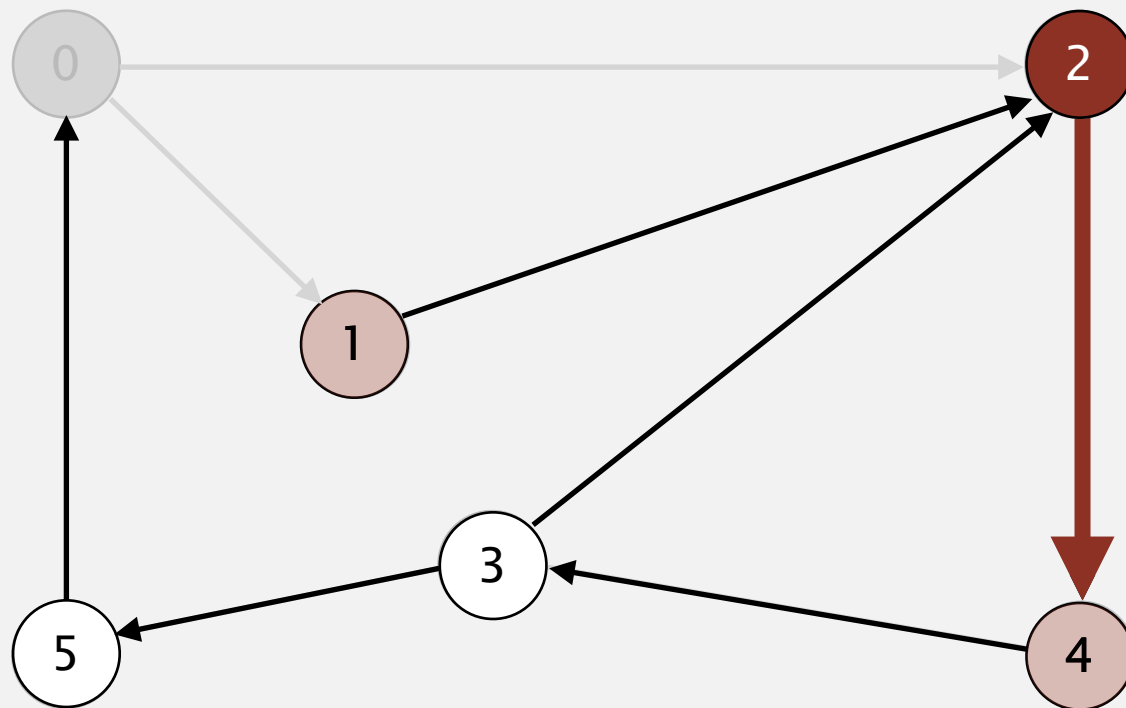


# Directed breadth-first search demo

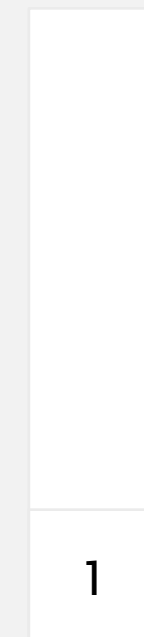
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



v	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	2	2
4	-	-
5	-	-

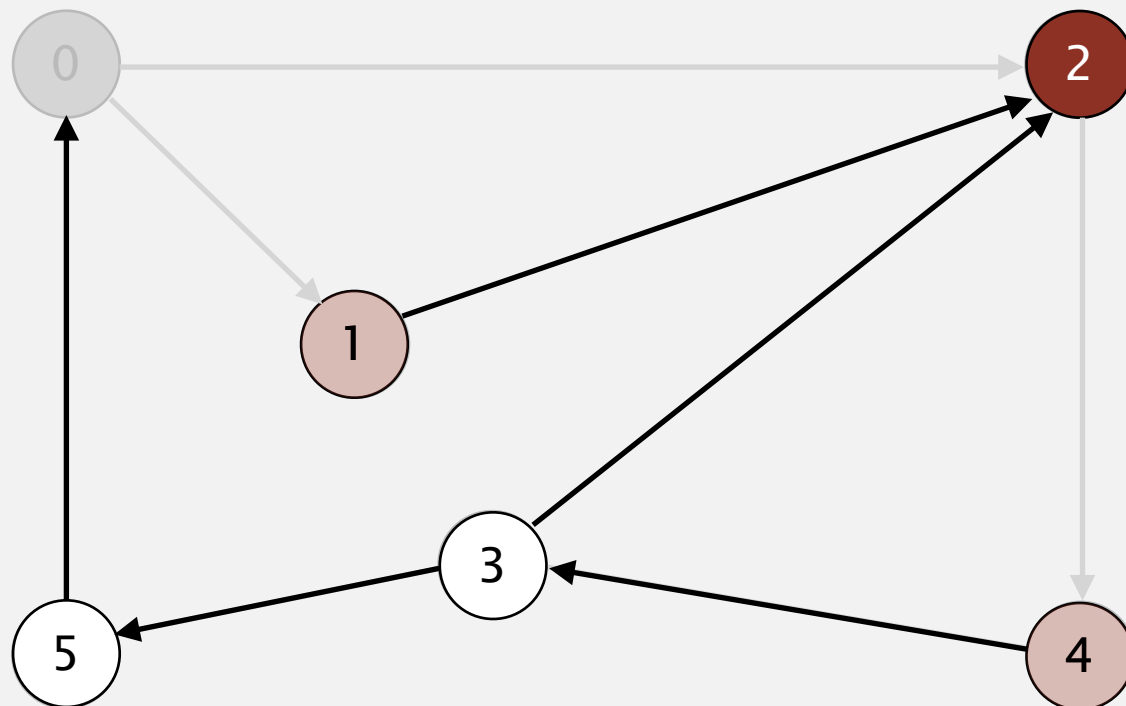
**dequeue 2: check 4**

# Directed breadth-first search demo

---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue

4
1

v	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	-	-
4	2	2
5	-	-

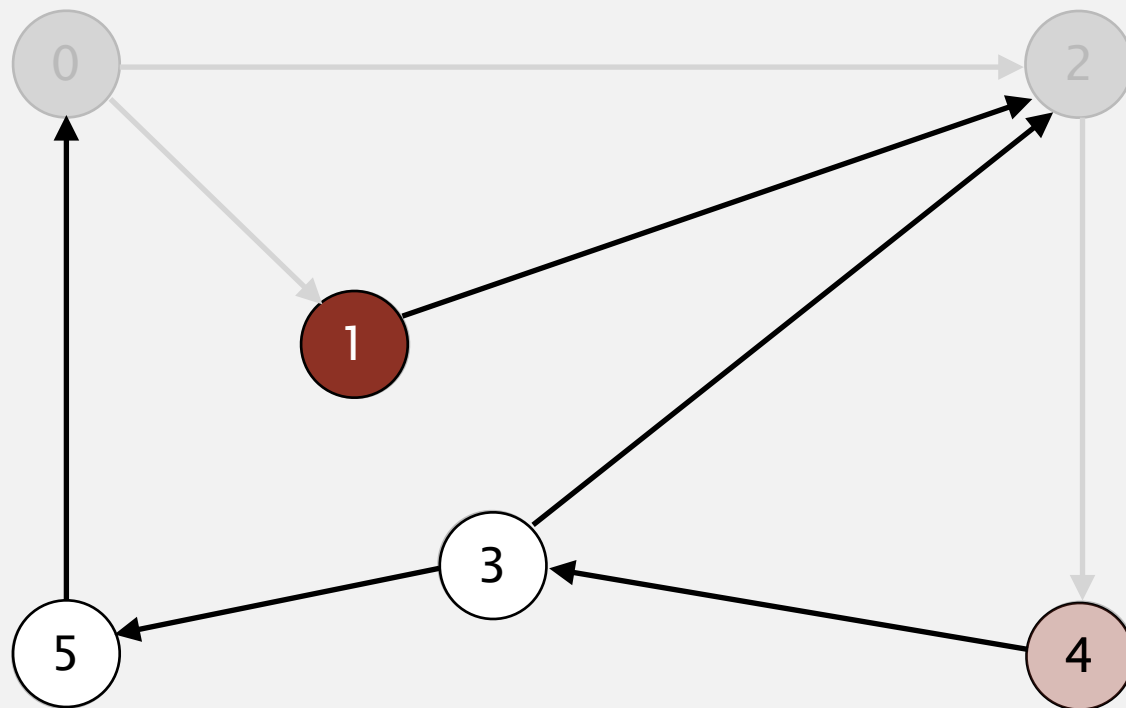
**2 done**

# Directed breadth-first search demo

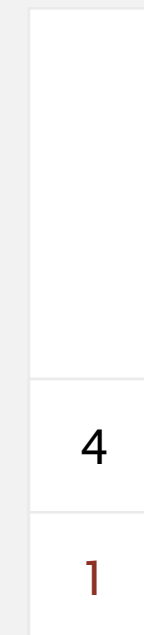
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



v	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	-	-
4	2	2
5	-	-

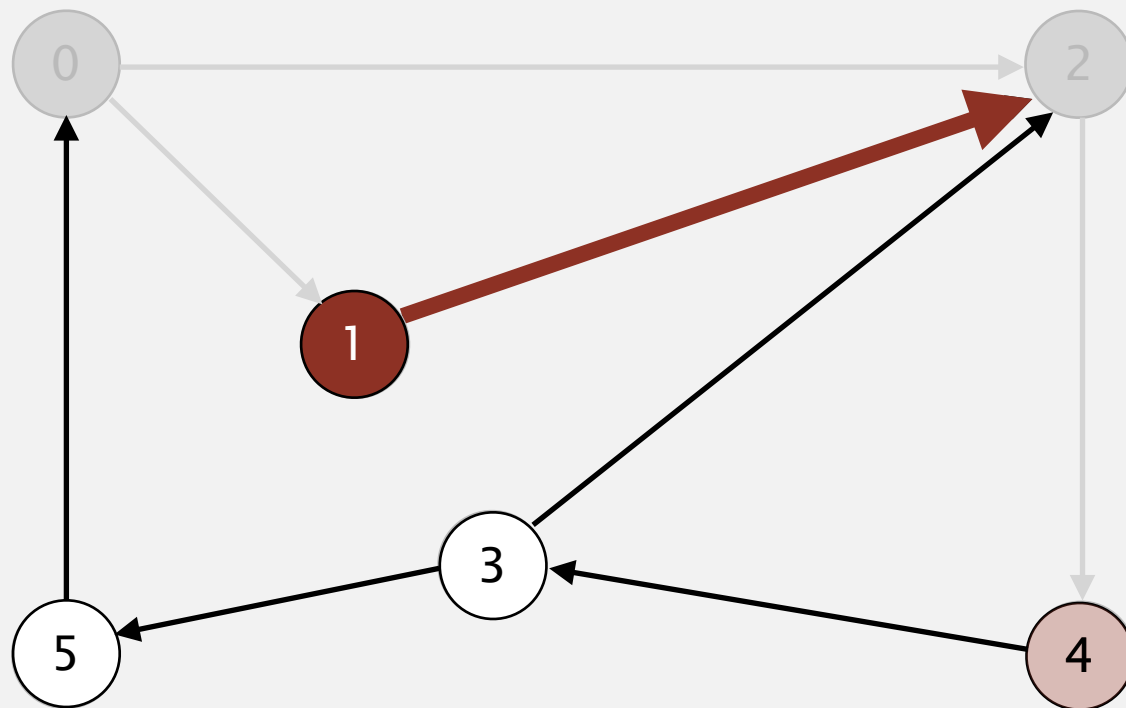
**dequeue 1**

# Directed breadth-first search demo

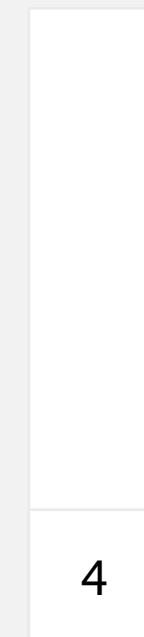
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



v	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	-	-
4	2	2
5	-	-

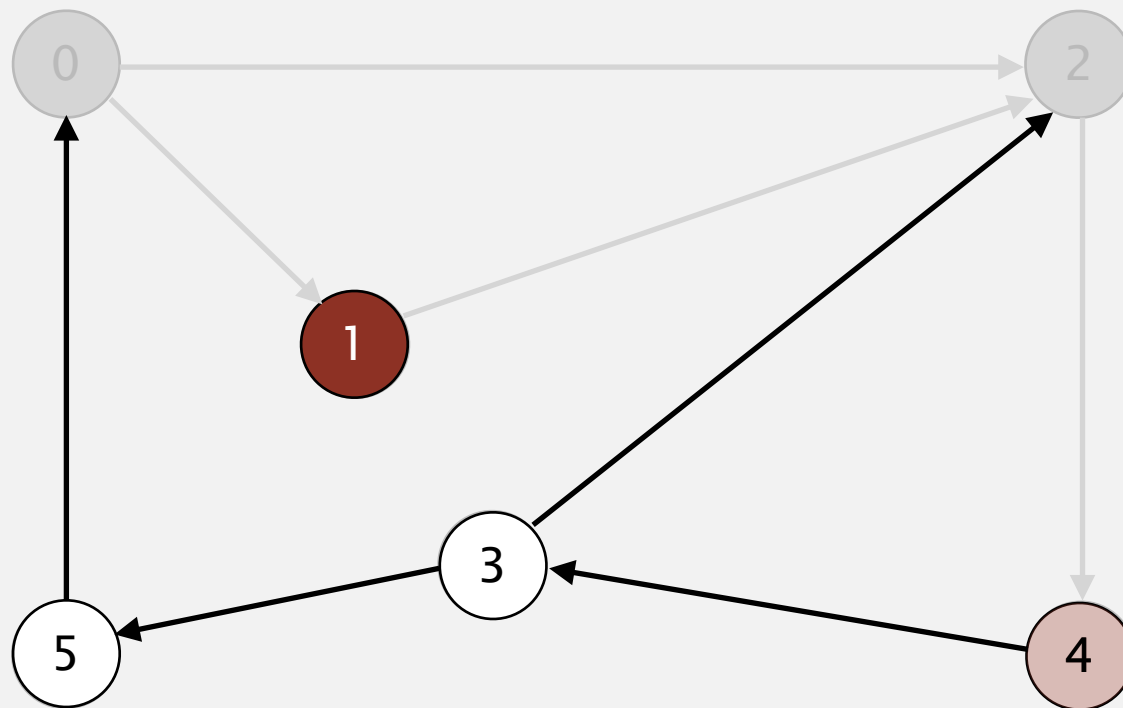
**dequeue 1; check 2**

# Directed breadth-first search demo

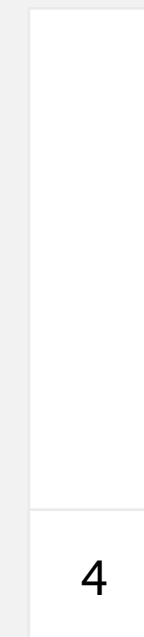
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



v	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	-	-
4	2	2
5	-	-

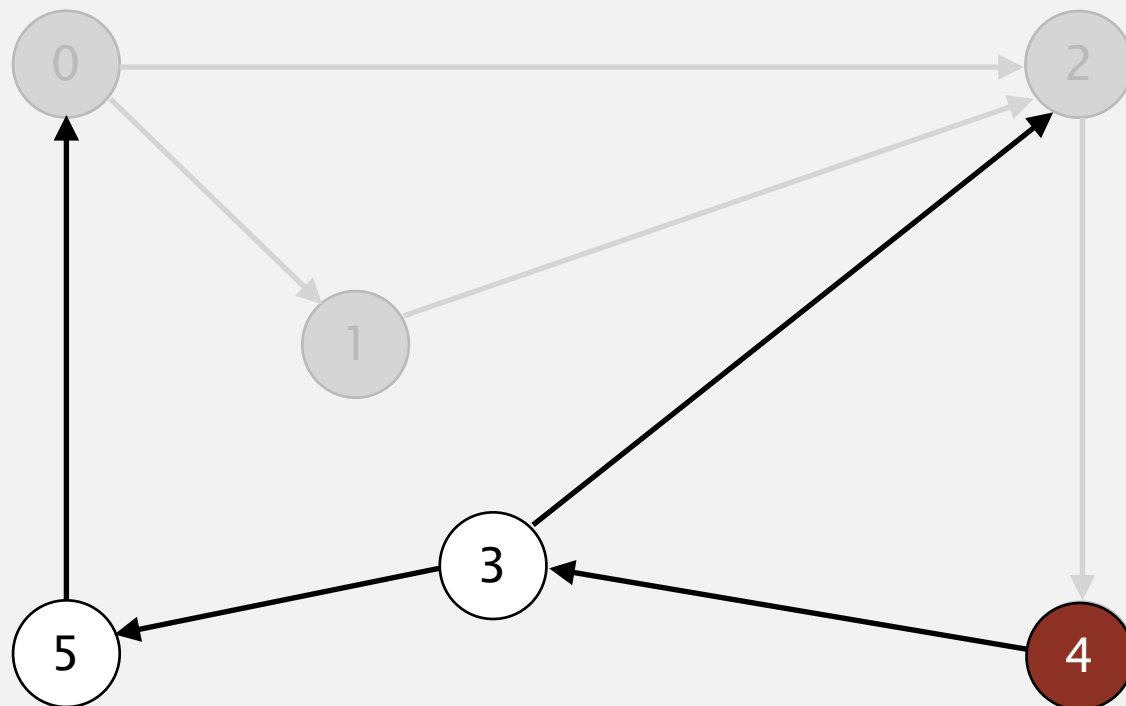
**1 done**

# Directed breadth-first search demo

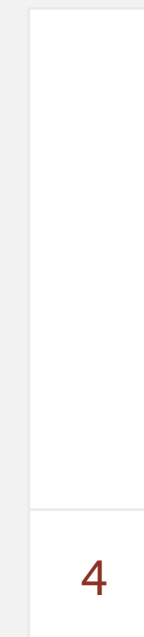
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



v	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	-	-
4	2	2
5	-	-

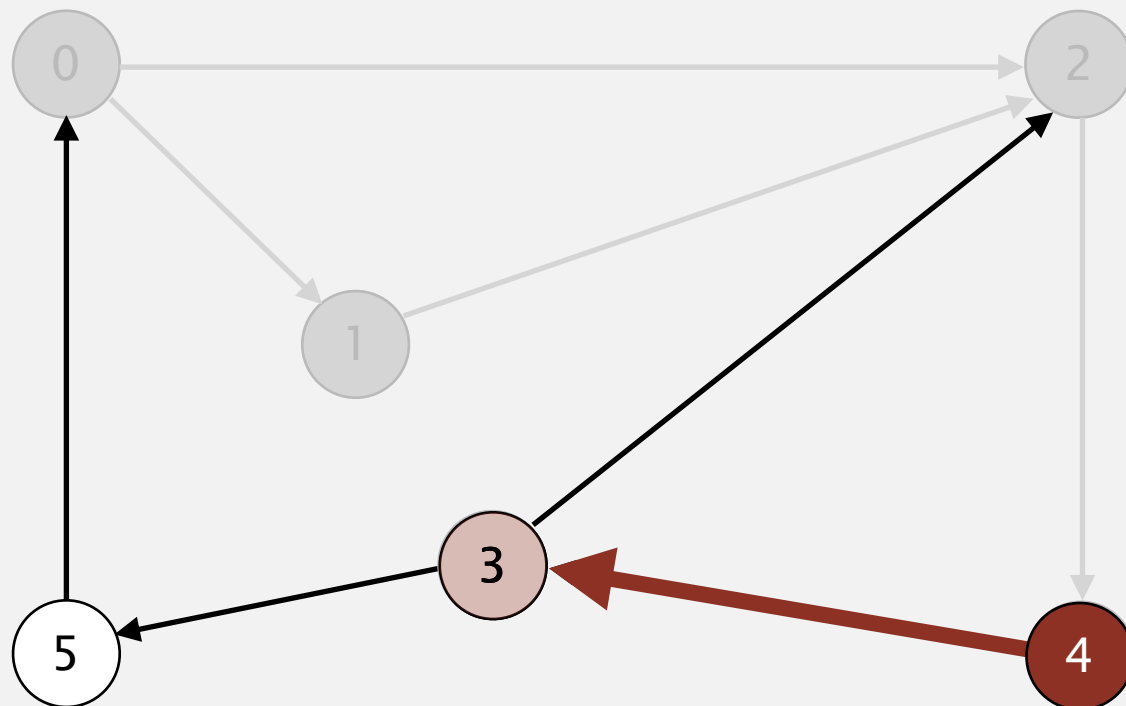
dequeue 4

# Directed breadth-first search demo

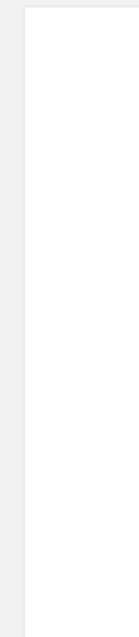
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



$v$	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	4	3
4	2	2
5	-	-

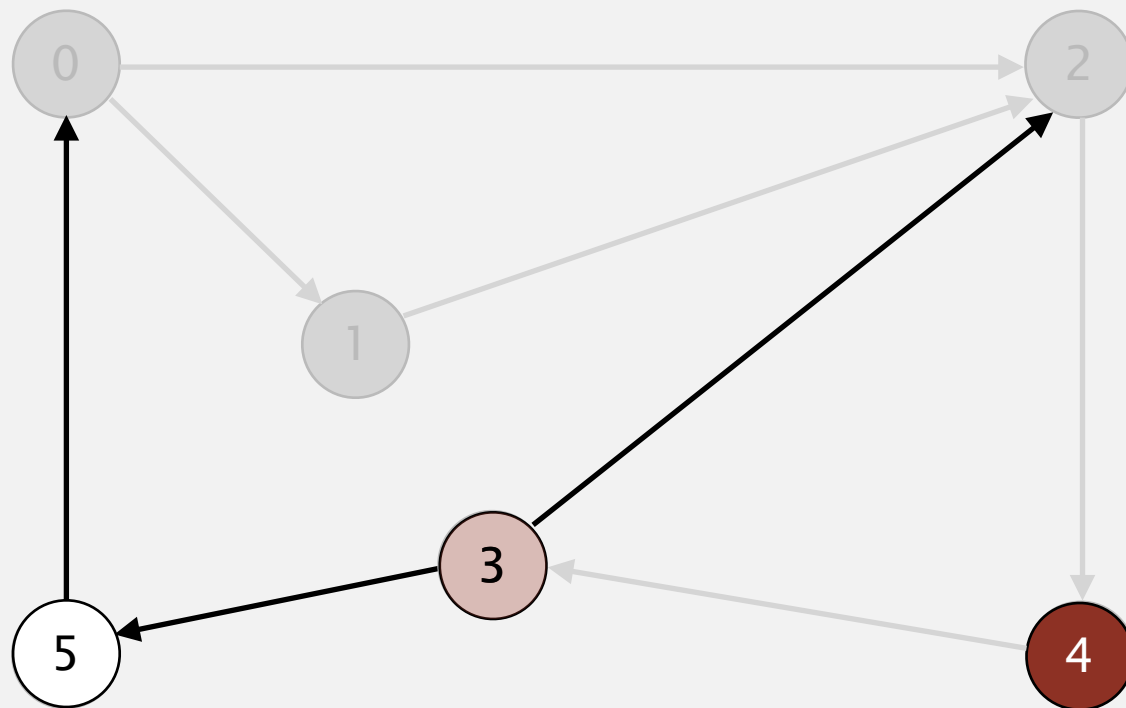
dequeue 4: check 3

# Directed breadth-first search demo

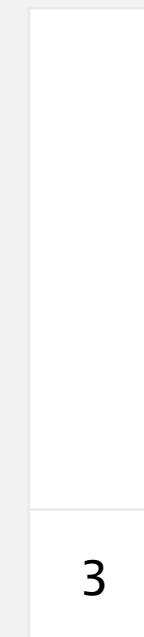
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



$v$	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	4	3
4	2	2
5	-	-

**4 done**

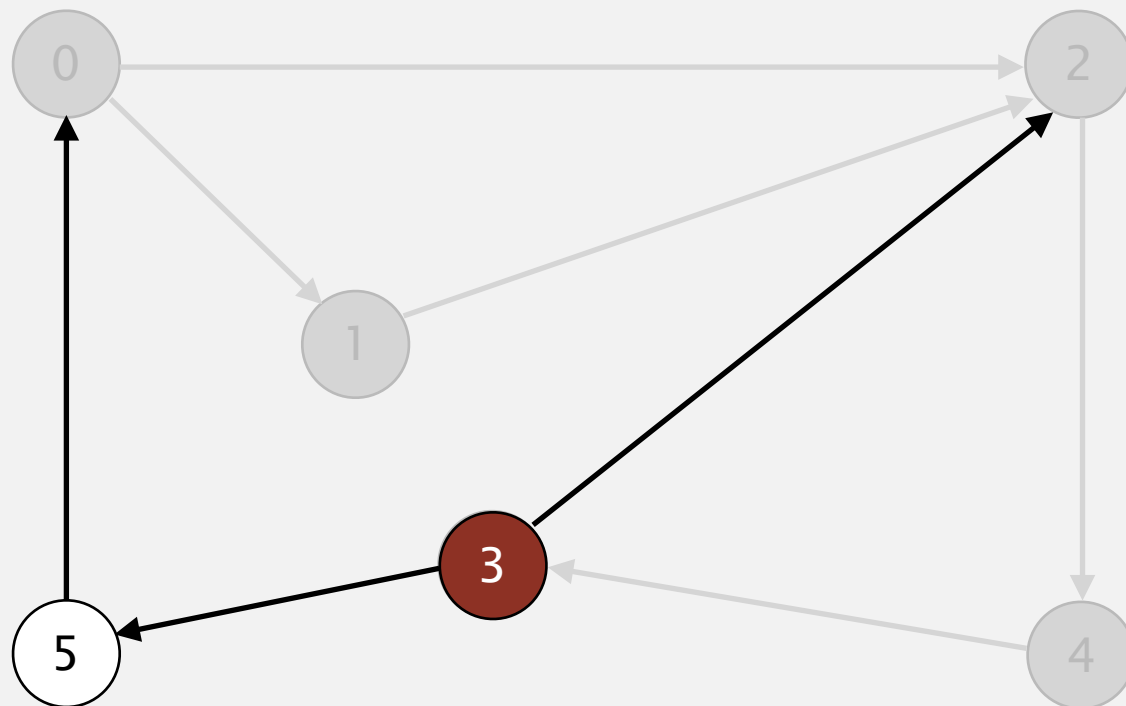


# Directed breadth-first search demo

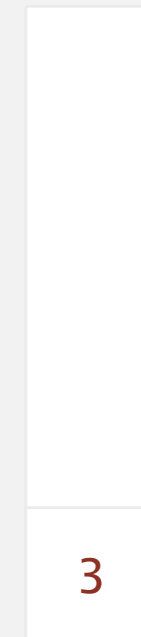
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



$v$	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	4	3
4	2	2
5	-	-

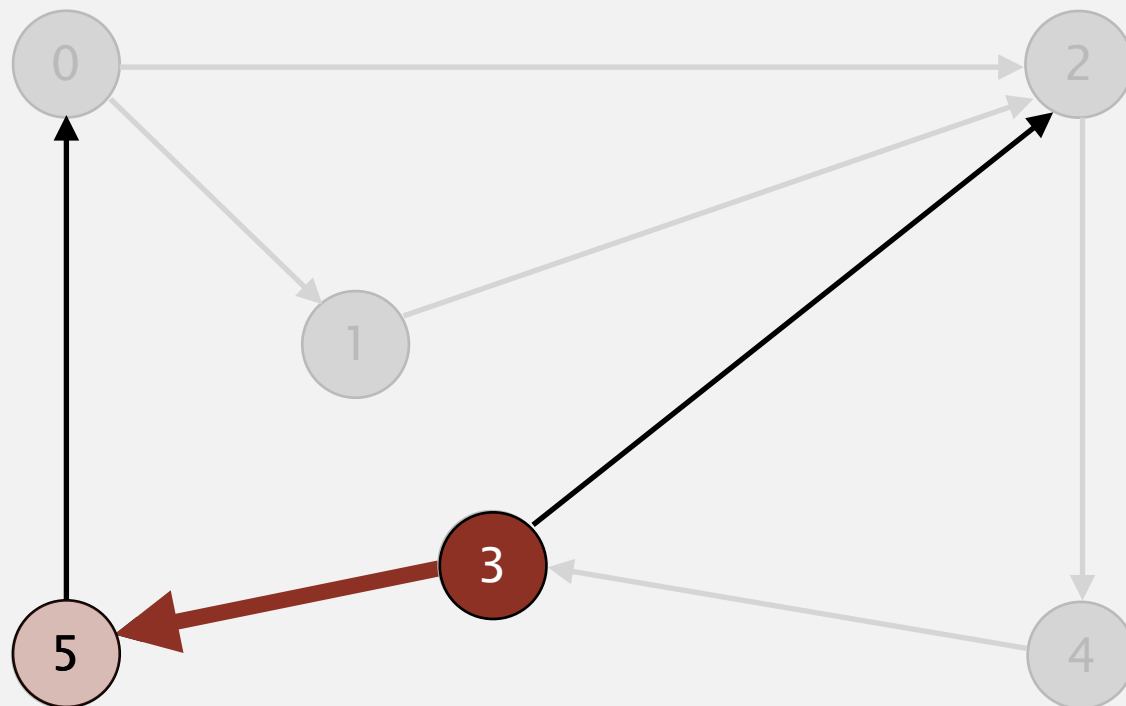
**dequeue 3**

# Directed breadth-first search demo

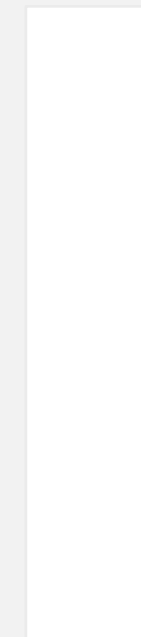
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



$v$	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	4	3
4	3	4
5	-	-

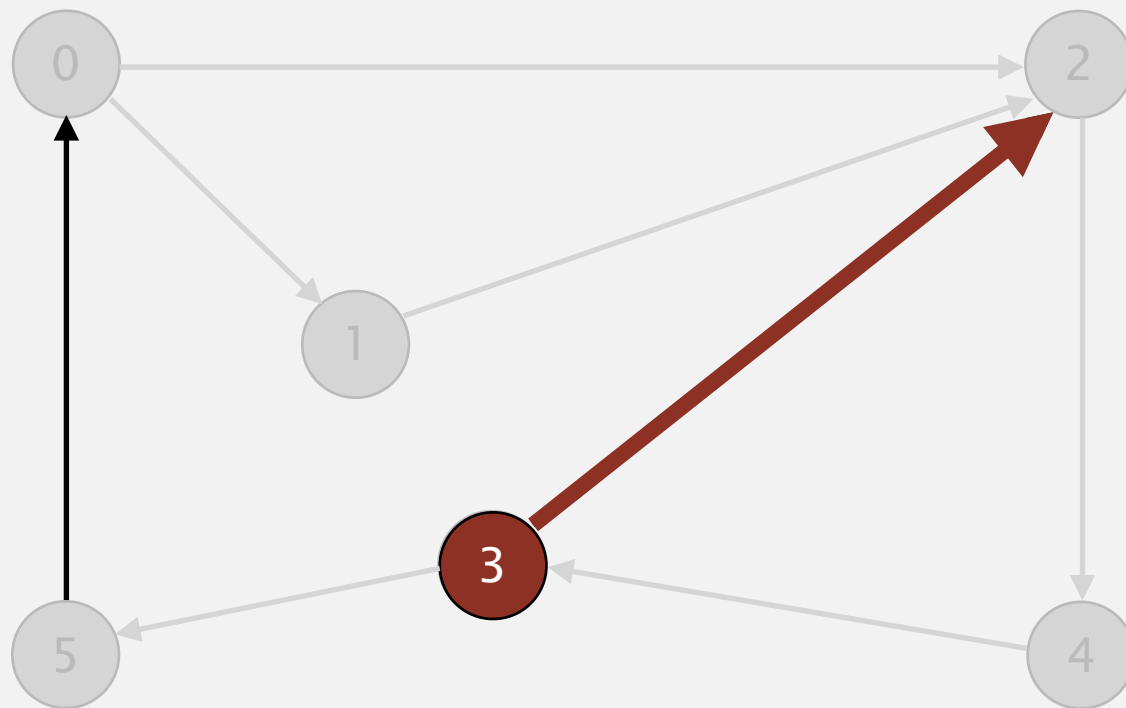
**dequeue 3: check 5 and check 2**

# Directed breadth-first search demo

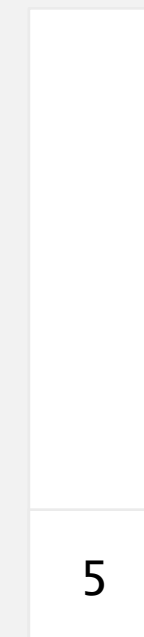
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



v	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	4	3
4	2	2
5	3	4

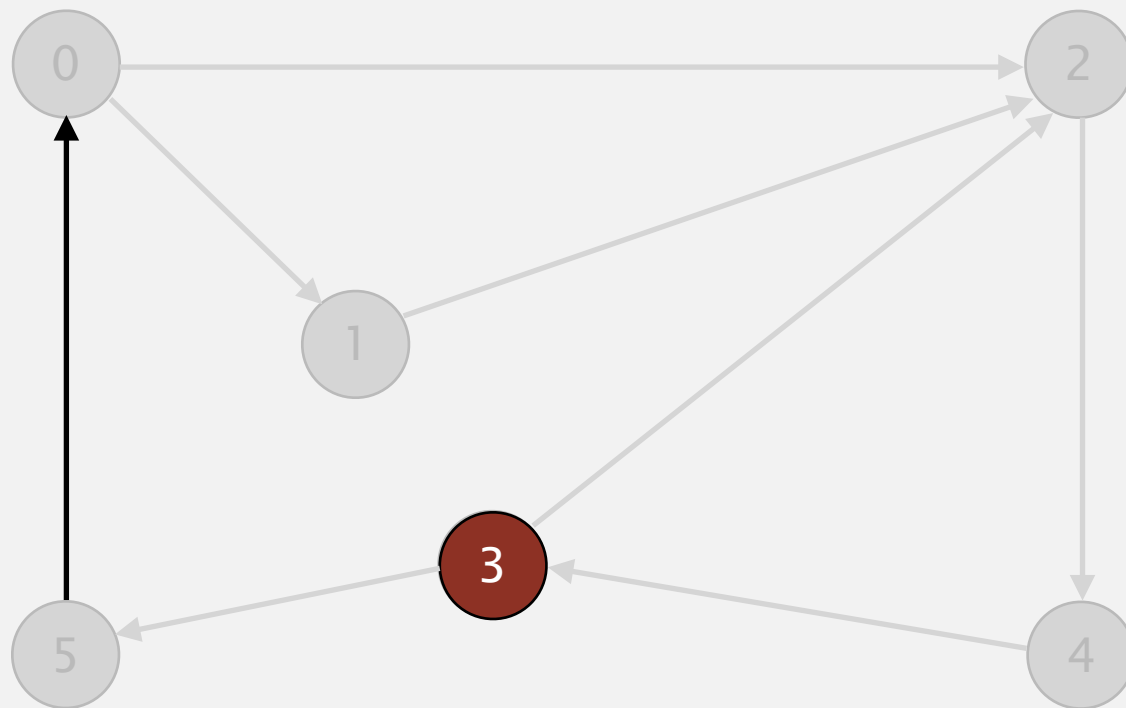
**dequeue 3:** check 5 and **check 2**

# Directed breadth-first search demo

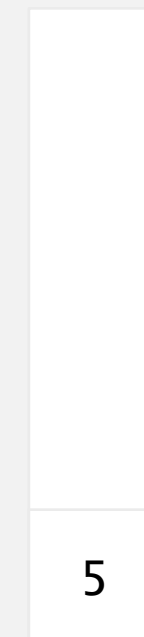
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



v	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	4	3
4	2	2
5	3	4

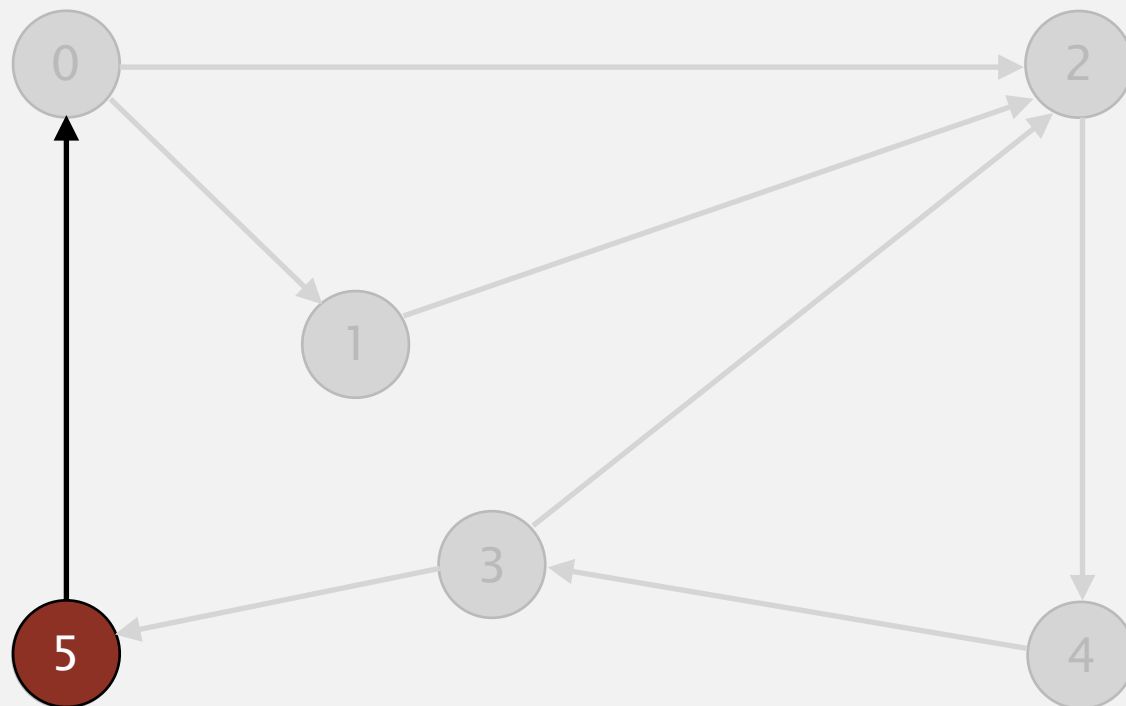
**3 done**

# Directed breadth-first search demo

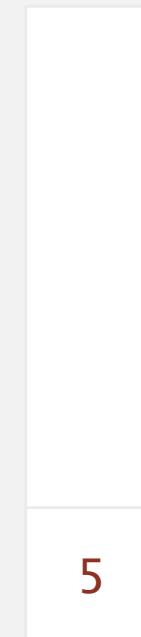
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



v	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	4	3
4	2	2
5	3	4

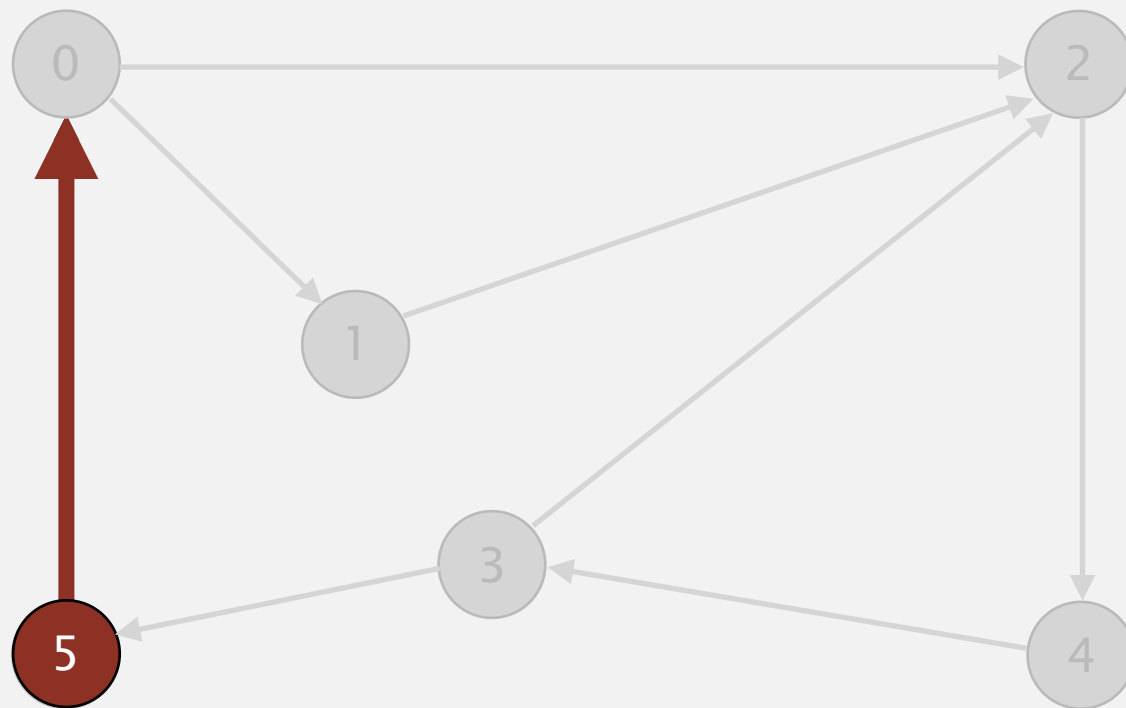
dequeue 5

# Directed breadth-first search demo

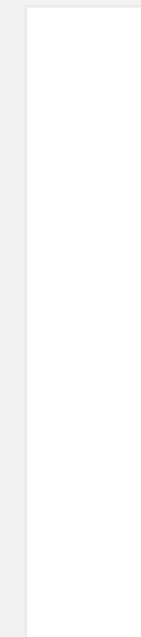
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



$v$	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	4	3
4	2	2
5	3	4

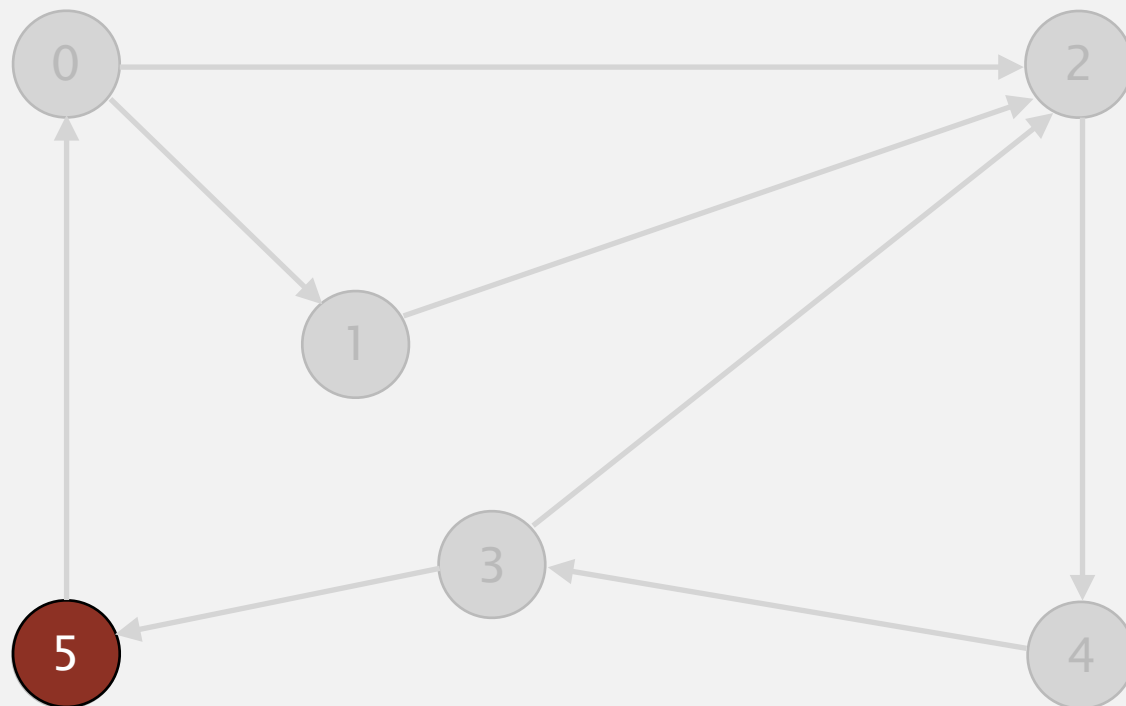
**dequeue 5: check 0**

# Directed breadth-first search demo

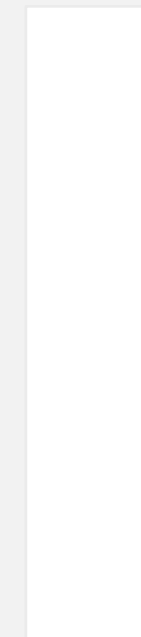
---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



queue



$v$	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	4	3
4	2	2
5	3	4

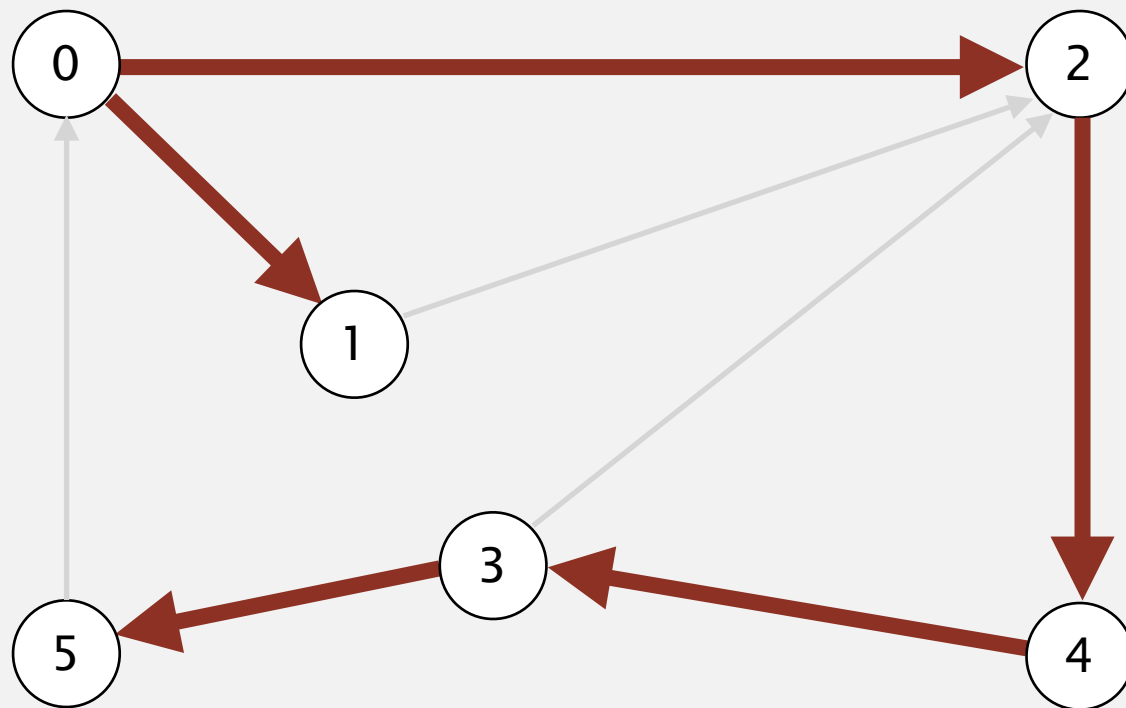
**5 done**

# Directed breadth-first search demo

---

Repeat until queue is empty:

- Remove vertex  $v$  from queue.
- Add to queue all unmarked vertices pointing from  $v$  and mark them.



$v$	edgeTo[]	distTo[]
0	-	0
1	0	1
2	0	1
3	4	3
4	2	2
5	3	4

done