

✓  
0

✓  
1

✓  
2

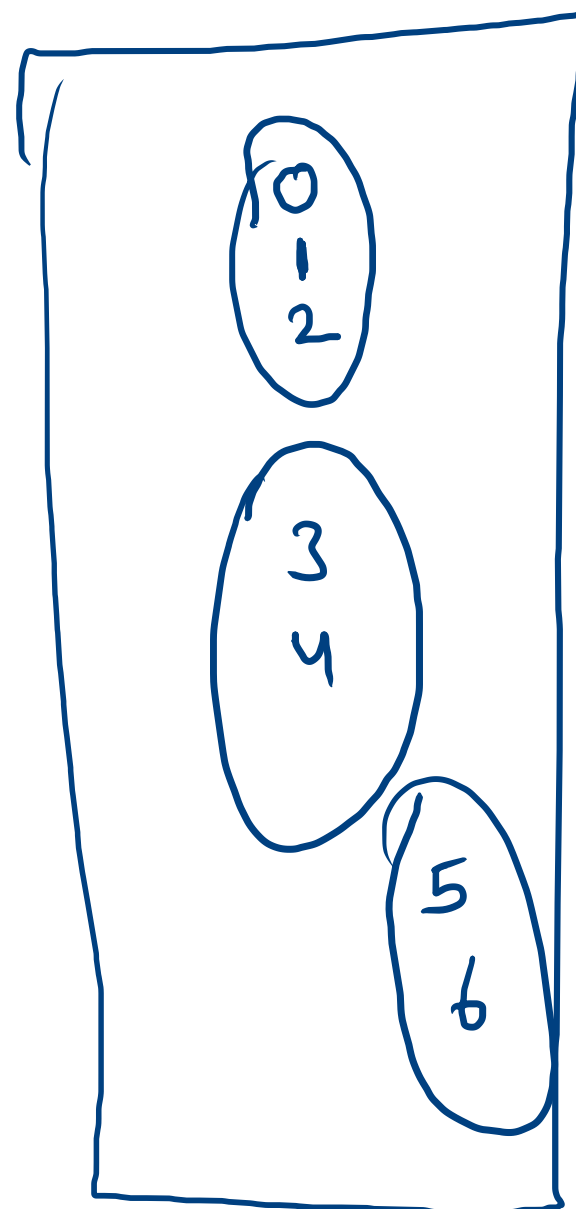
✓  
3

✓  
4

✓  
5

✓  
6

comp



comp

```

boolean visited[] = new boolean[vtces];

for(int i=0;i<vtces;i++){
    if(visited[i] == false){
        ArrayList<Integer> comp = new Arrayl
        gcc(graph, i, visited, comp);
        comps.add(comp);
    }
}

System.out.println(comps);

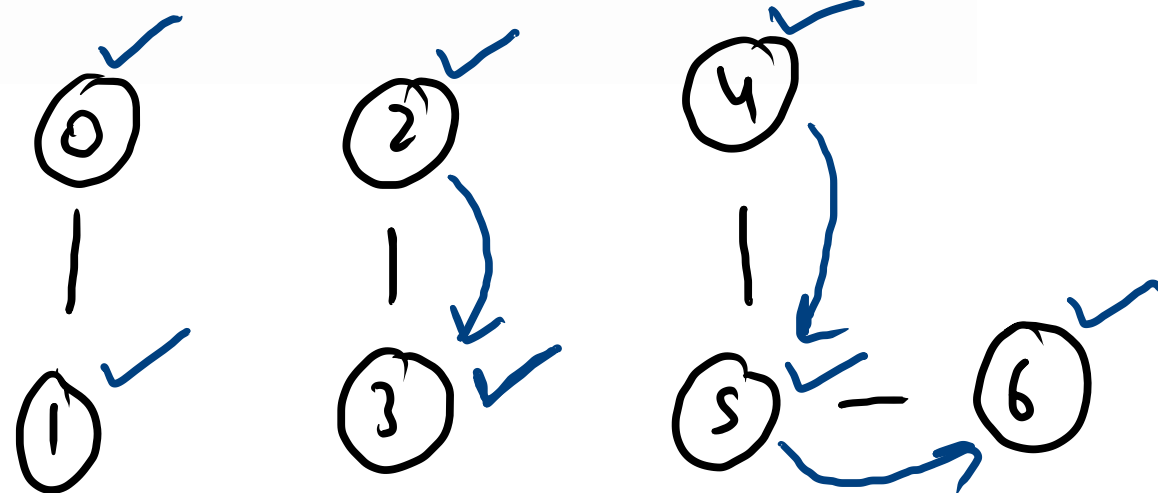
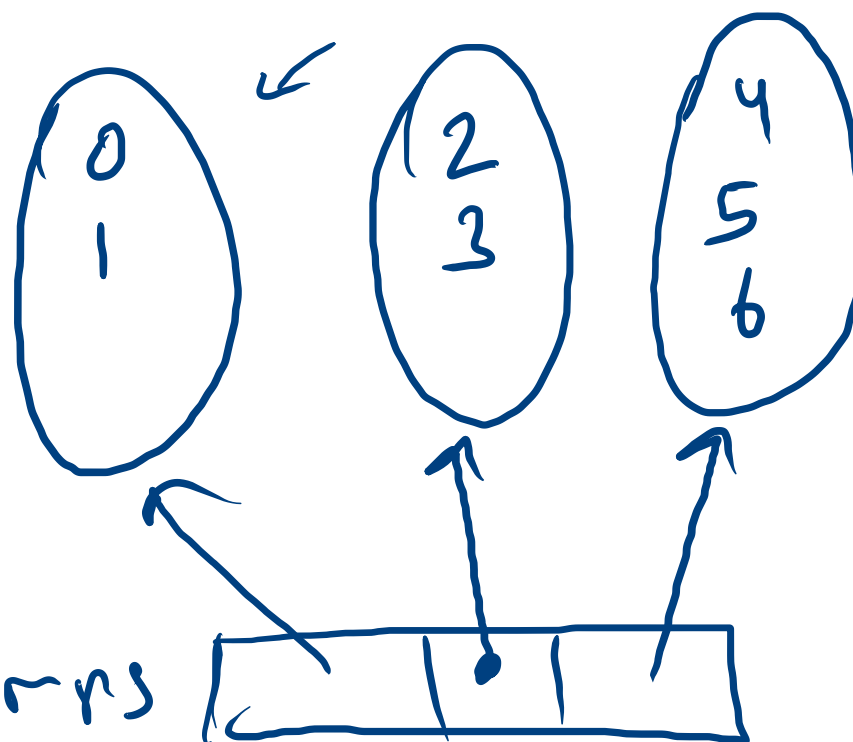
```

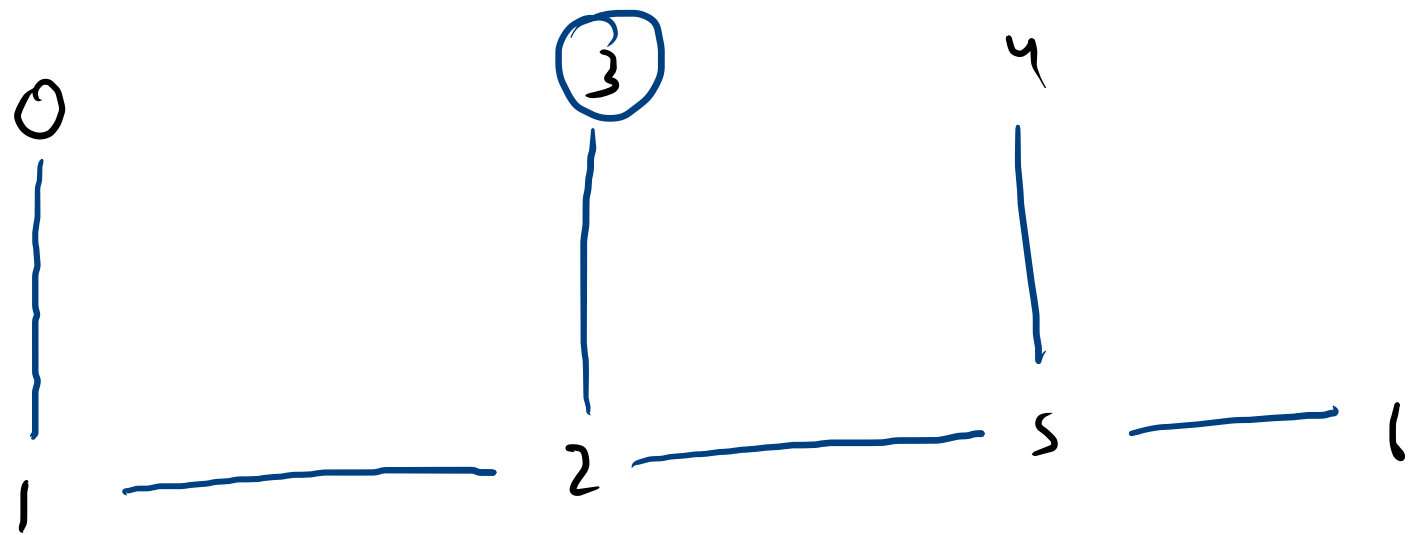
```

public static void gcc( ArrayList<Edge>[] graph,
    visited[src] = true;
    comp.add(src);
    for(Edge e: graph[src]){
        if(visited[e.nbr] == false){
            gcc(graph, e.nbr, visited, comp);
        }
    }
}

```

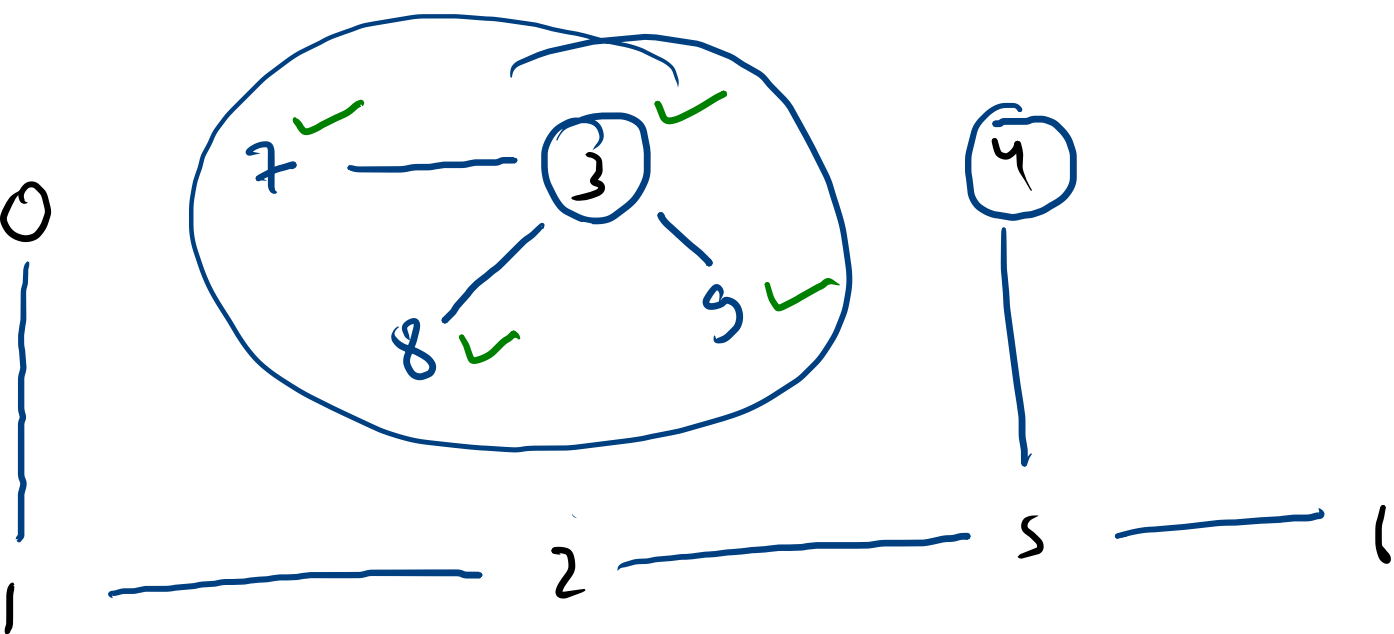
0 1 2 3 4



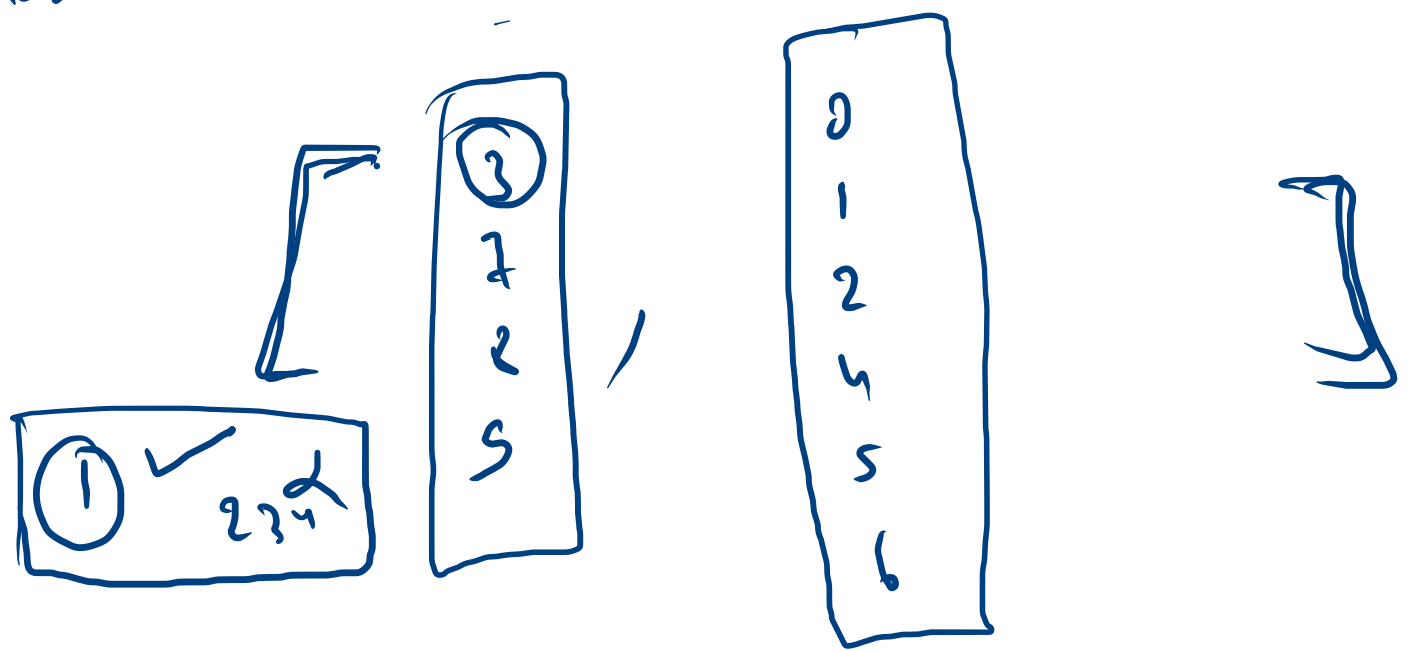


connect 2

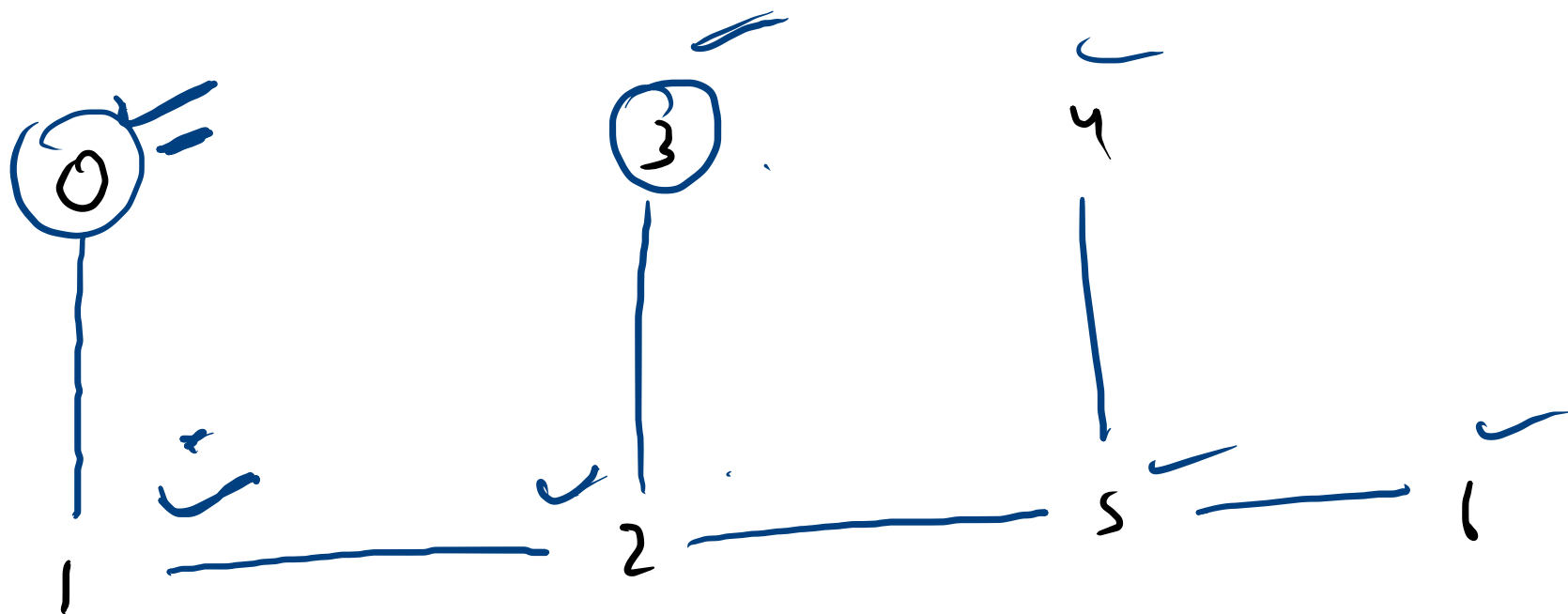
0	1	2	3	4	5	6	7	8	9
1	1	1	✓	1	1	1	✓	✓	✓



not connect

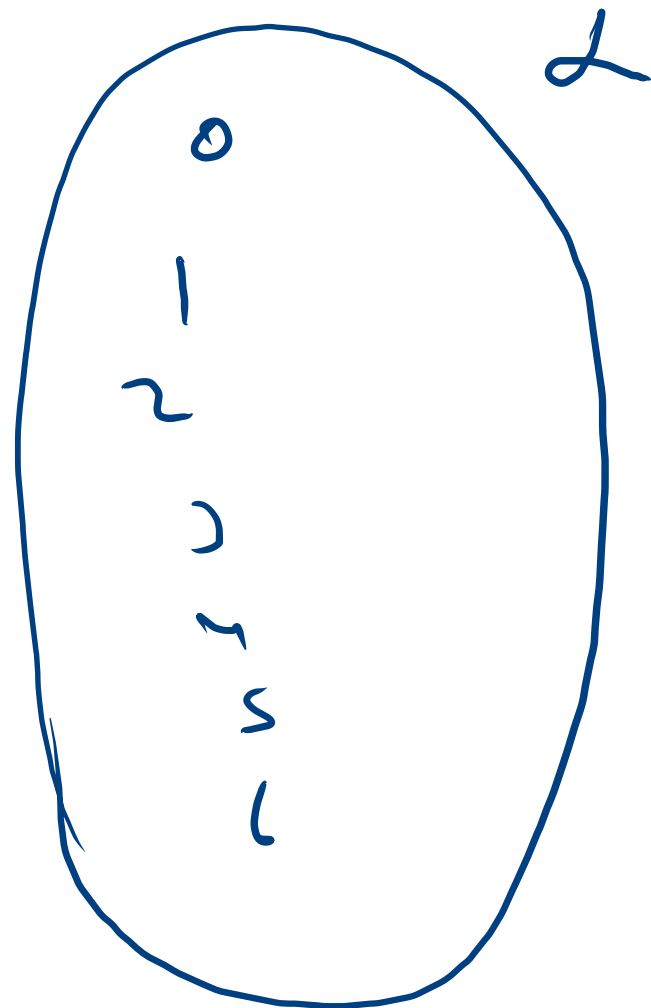


①

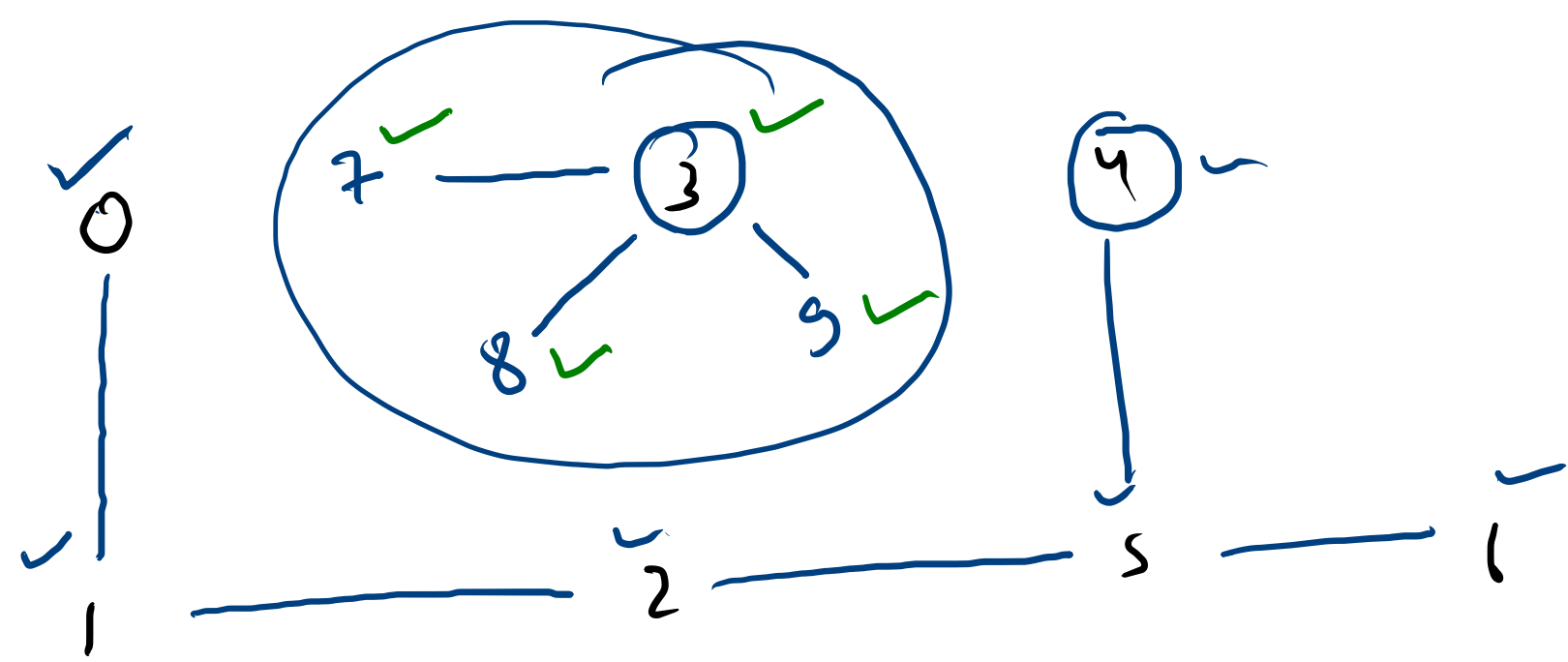


0 (✓)

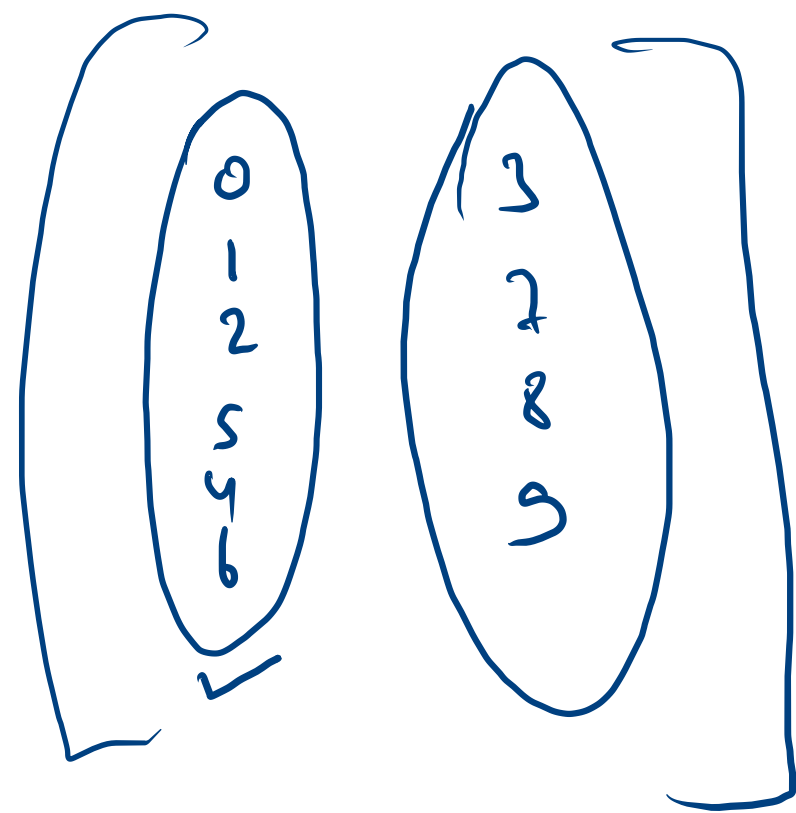
0 (✓)



★ recursion

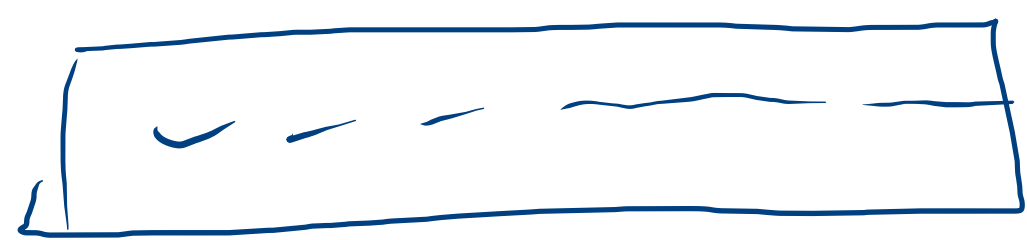


$O(v)$

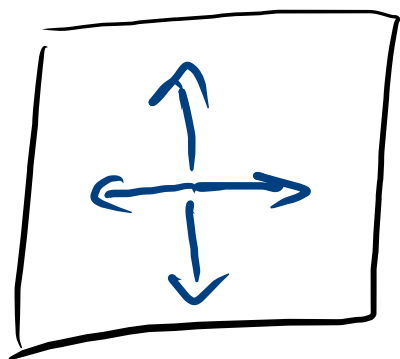
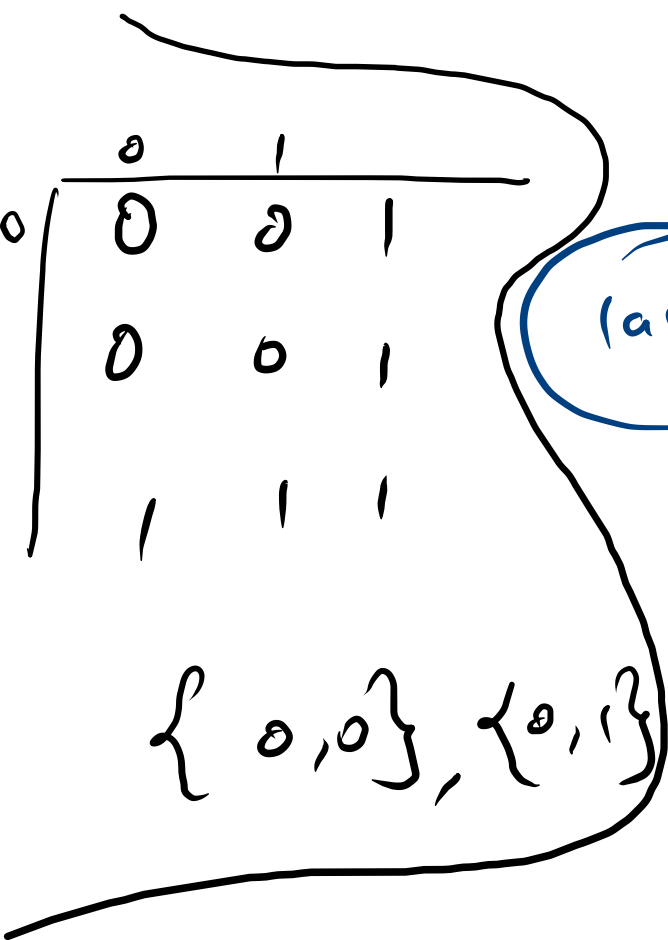


$O(v)$

$[O(v)]$



0, 1, 2, 5, 4, 6



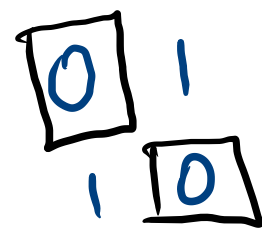
land

row

col

8	8								
0	0	1	1	1	1	1	1		
0	0	1	1	1	1	1	1		
		1	1	1	1	1	1	0	
		1	1	0	0	0	1	1	0
		1	1	1	1	0	1	1	0
		1	1	1	1	0	1	1	0
		1	1	1	1	1	1	1	0
		1	1	1	1	1	1	1	0

3

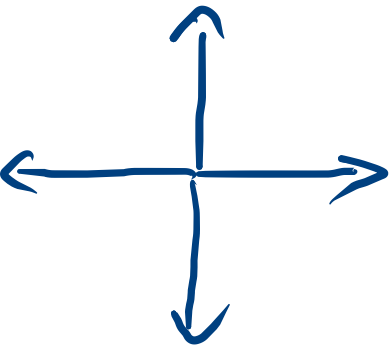


2

0 - land  
1 - water

2

Jan 2



8	8							
0	0	1	1	1	1	1	1	
0	0	1	1	1	1	1	1	
1	1	1	1	1	1	1	0	
1	1	0	0	0	1	1	0	
1	1	1	1	0	1	1	0	
1	1	1	1	0	1	1	0	
1	1	1	1	1	1	1	0	
1	1	1	1	1	1	1	0	


$$\text{count} = 0 + 23$$

```
int count = 0;
for(int i=0; i<m; i++){
    for(int j=0; j<n; j++){
        if(arr[i][j] == 0 && !visited[i][j]){
            gcc(i, j, arr, visited);
            count++;
        }
    }
}
```

hxr

$$O(n \times n)$$

dfs



```
public static void gcc(int i, int j, int
    if(i<0 || j< 0||i>=arr.length ||
    j>= arr[0].length || arr[i][j] == 1
    || visited[i][j])return;
```

```
visited[i][j] = true;
```

```

    • gcc(i, j+1, arr, visited);
    • gcc(i, j-1, arr, visited);
    • gcc(i+1, j, arr, visited);
    • gcc(i-1, j, arr, visited);

```

$$O(n \times m)$$

BFS

A 7x7 grid of 0s and 1s. The grid is as follows:

0	0	1	1	1	1	1	1
0	0	1	1	1	1	1	1
1	1	1	1	1	1	1	0
1	1	0	0	0	1	1	0
1	1	1	1	0	1	1	0
1	1	1	1	0	1	1	0
1	1	1	1	1	1	1	0

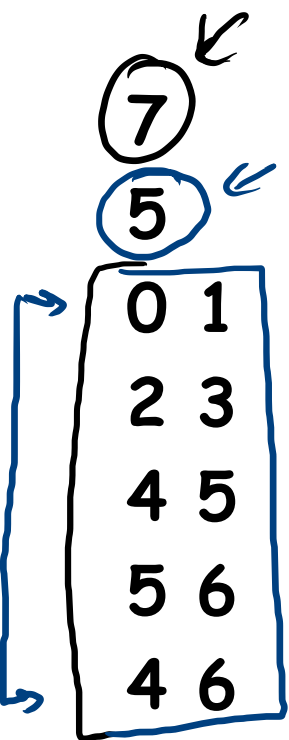
Handwritten blue annotations:

- A 2x2 box in the top-left corner highlights the four 0s.
- An L-shaped box highlights a region of 0s: the third row, fourth column; the fourth row, second, third, and fourth columns; and the fifth row, fourth column.
- A vertical box on the right side highlights the entire rightmost column, which contains all 0s.

A collection of 15 hand-drawn diagrams of cells, each with a red nucleus and a blue nucleolus. The cells are enclosed in various colored outlines: blue, green, black, and red. Some cells have additional features like a red squiggle or a black squiggle.

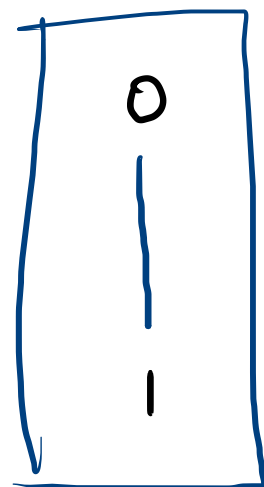


0...6

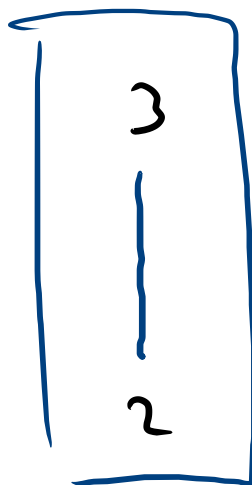


graph

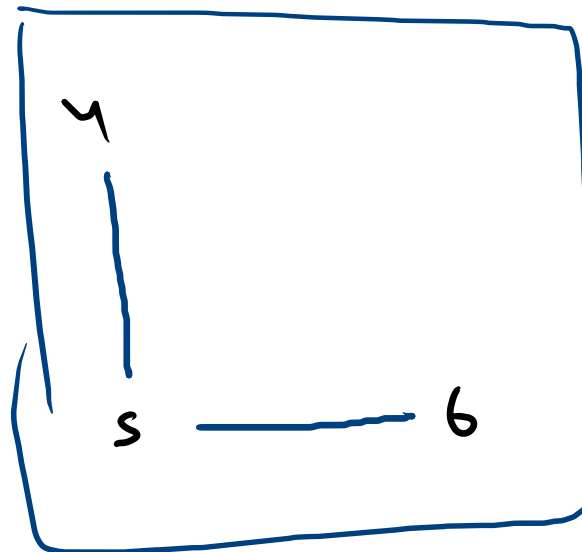
16



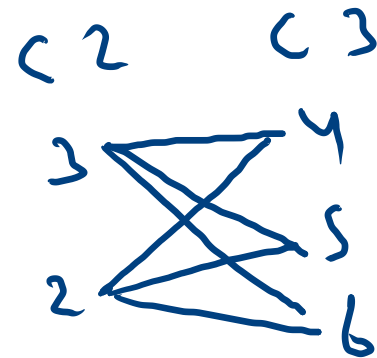
c1



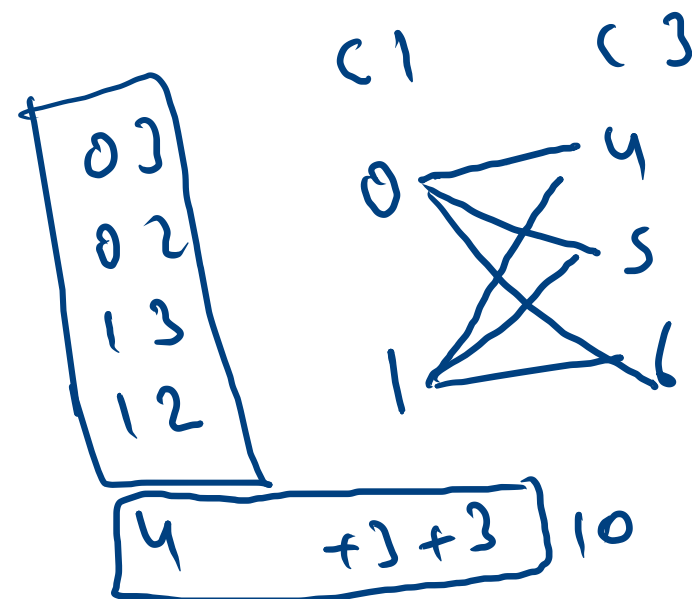
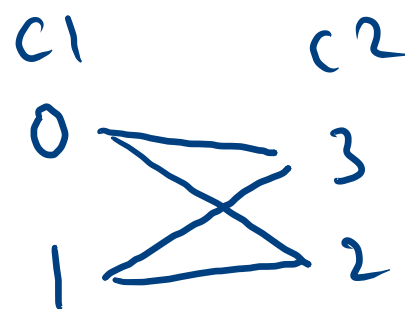
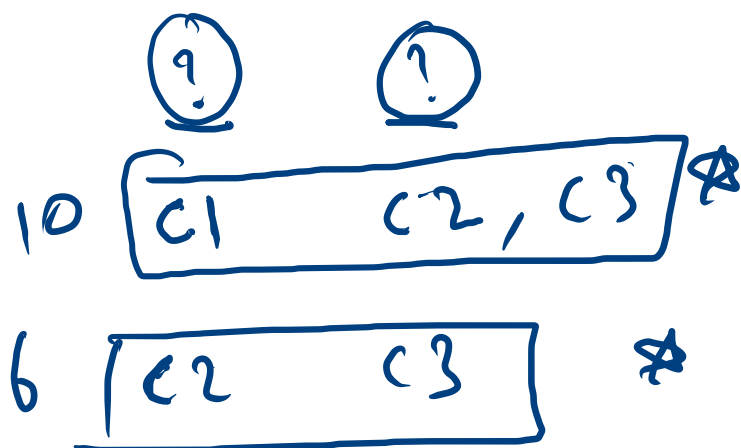
c2

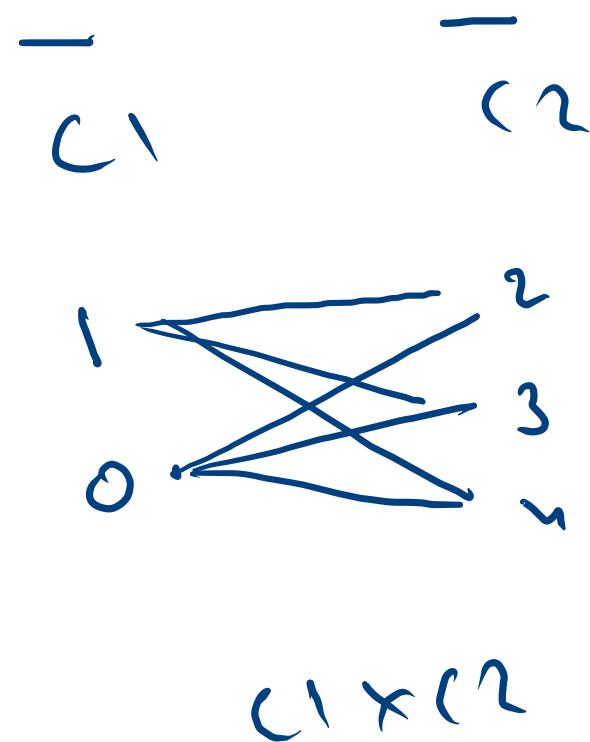
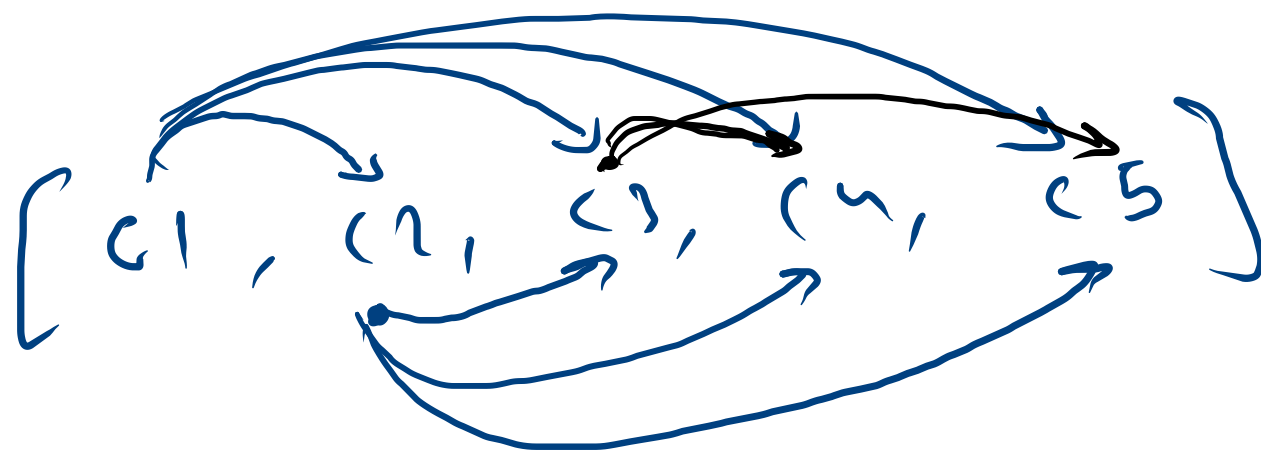
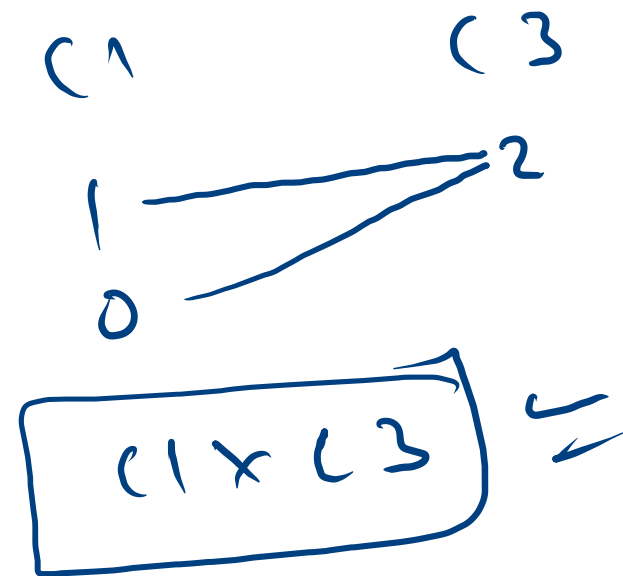
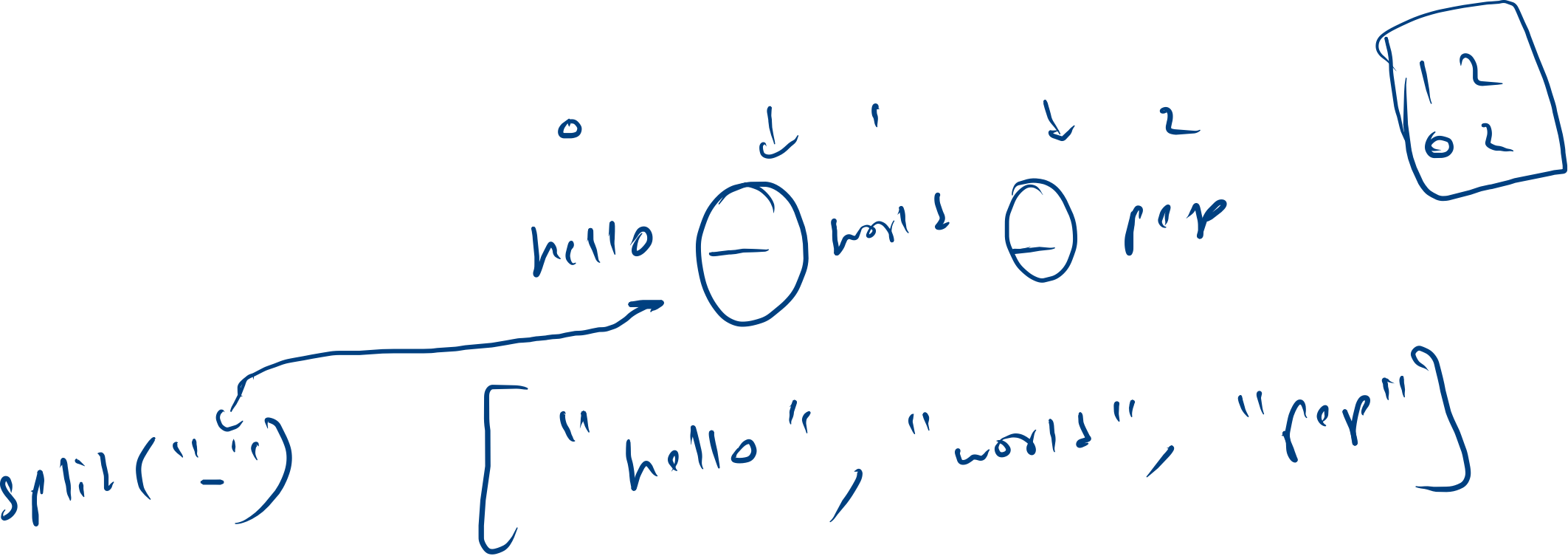


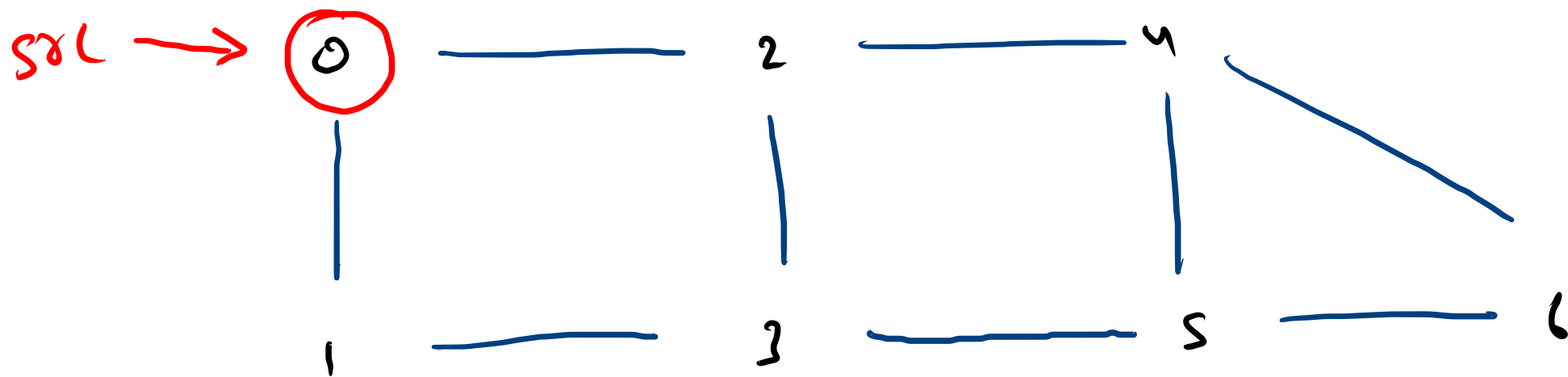
c3



3+3







cycle

all visit once

0 1 3 2 4 5 6.

0 1 3 2 4 6 5.

0 2 4 6 5 3 1\*

0 1 3 5 6 4 2\*

path

path

cycle

cycle