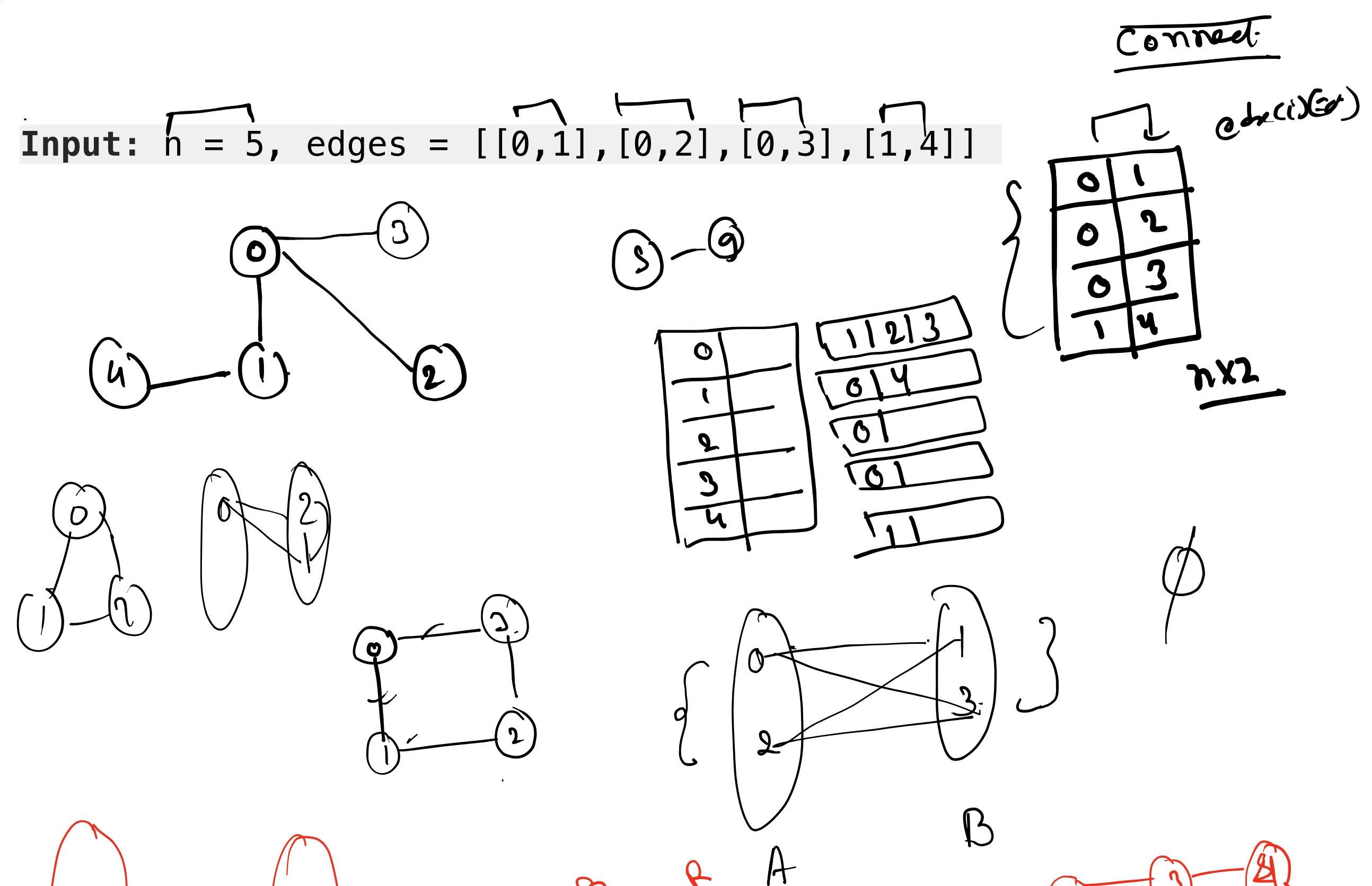
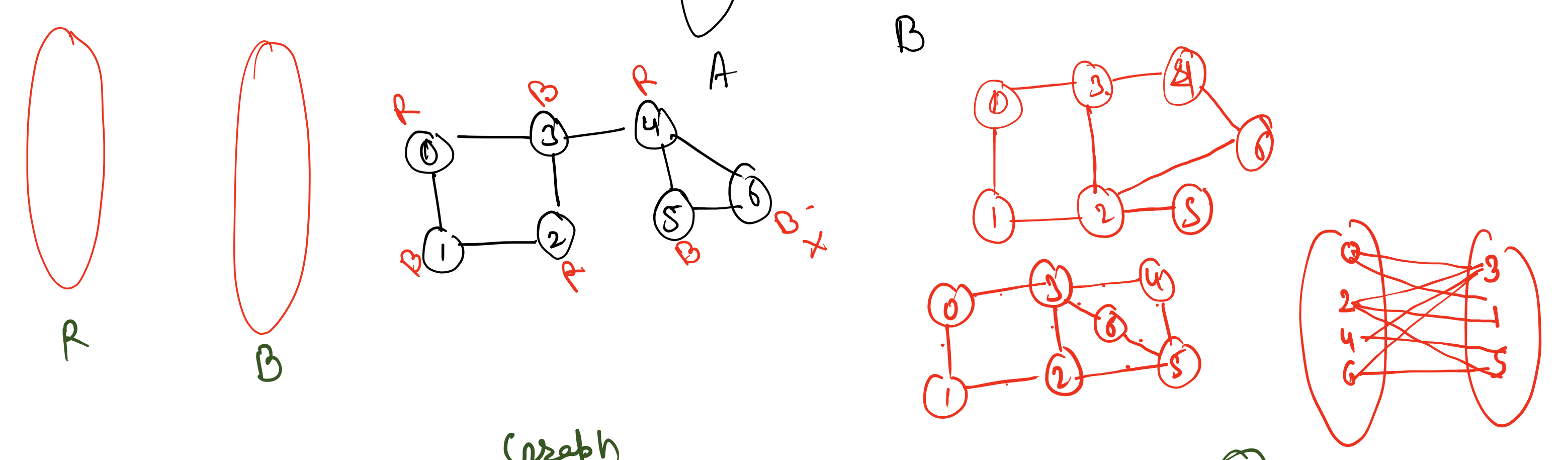
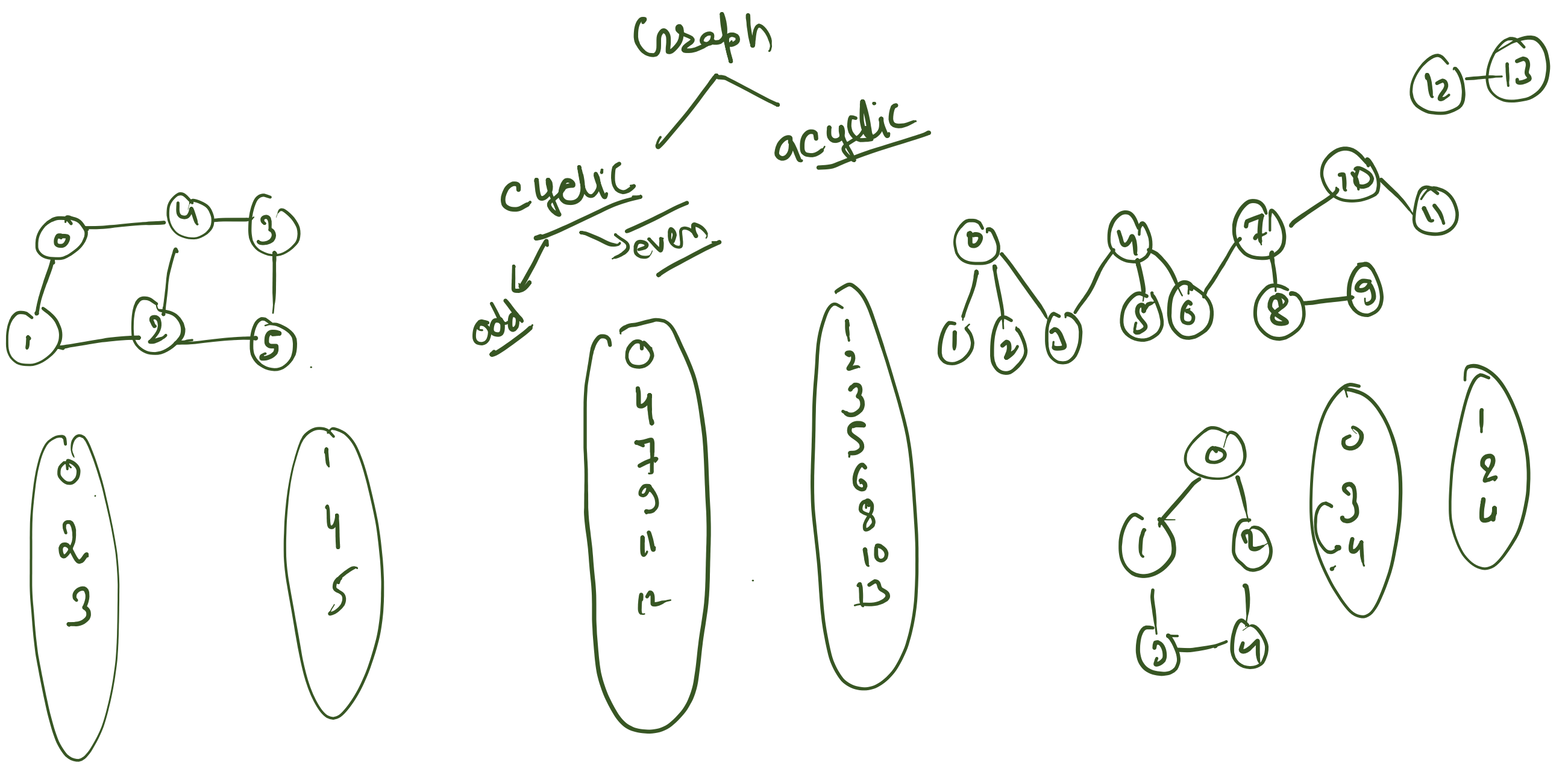
Lec-40

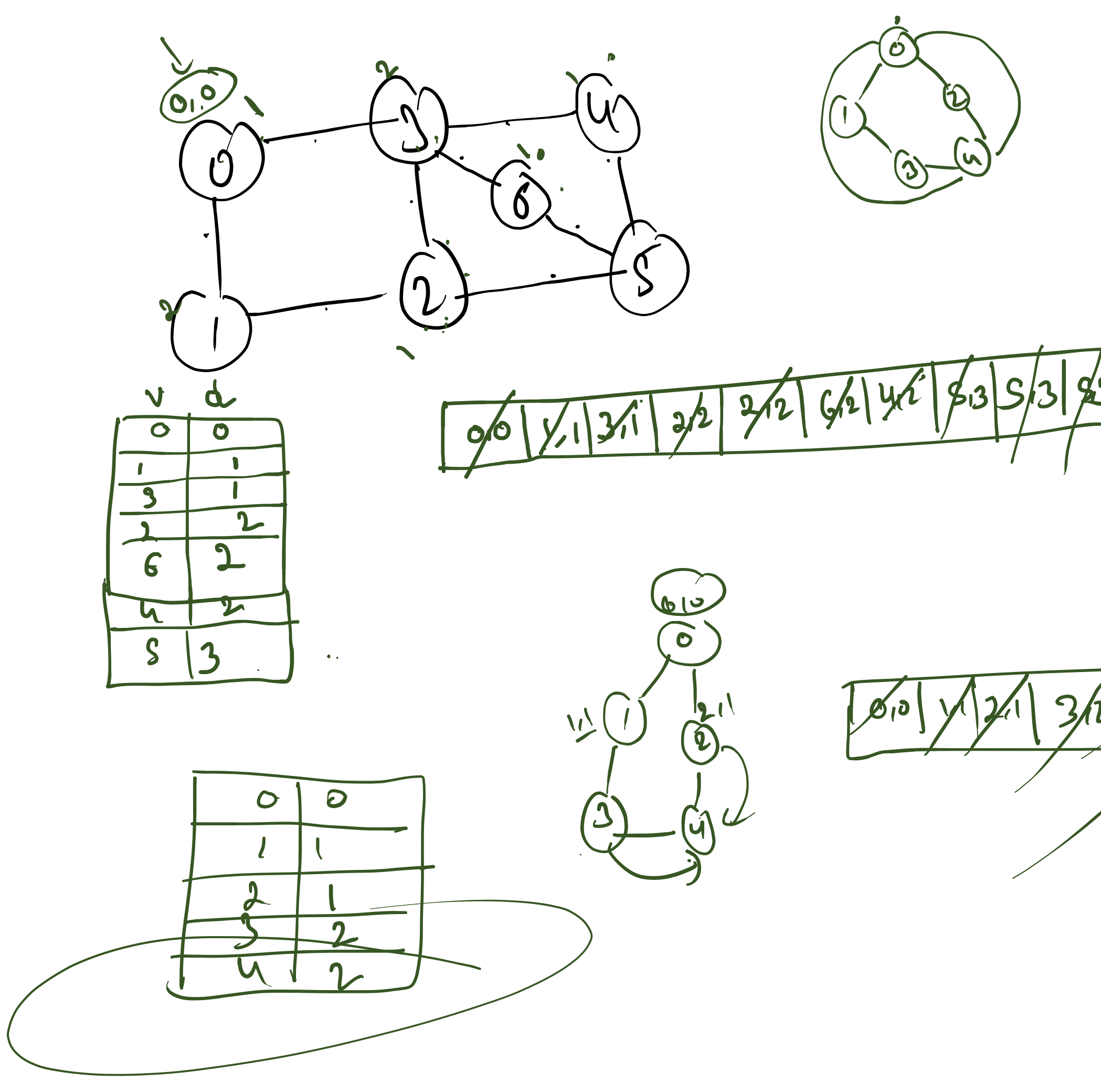
14/09/25 2:24 PM

`Input: n = 5, edges = [[0,1],[0,2],[0,3],[1,4]]`

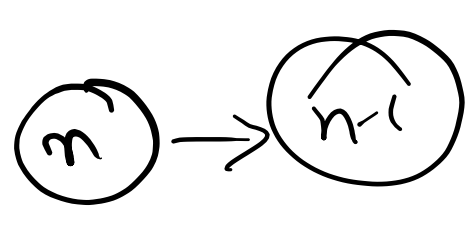






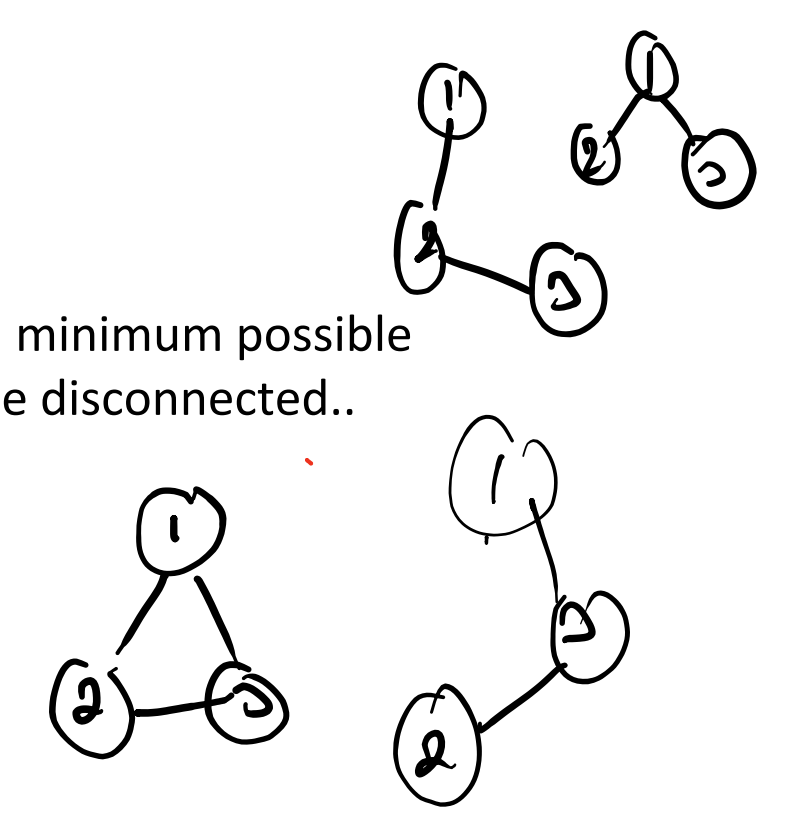


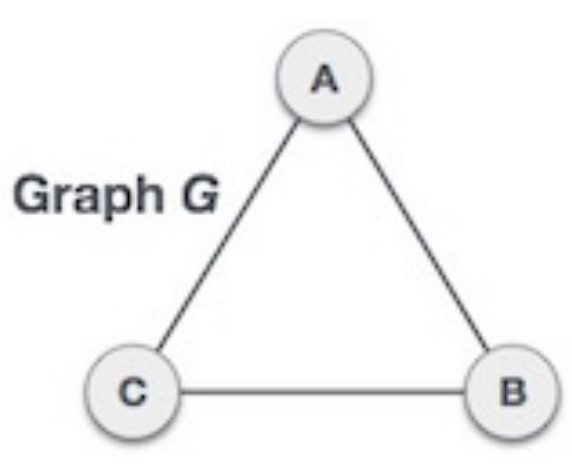
1. remove
2. ignore
3. marked visited
4. self work
5. Add unvisited nbrs



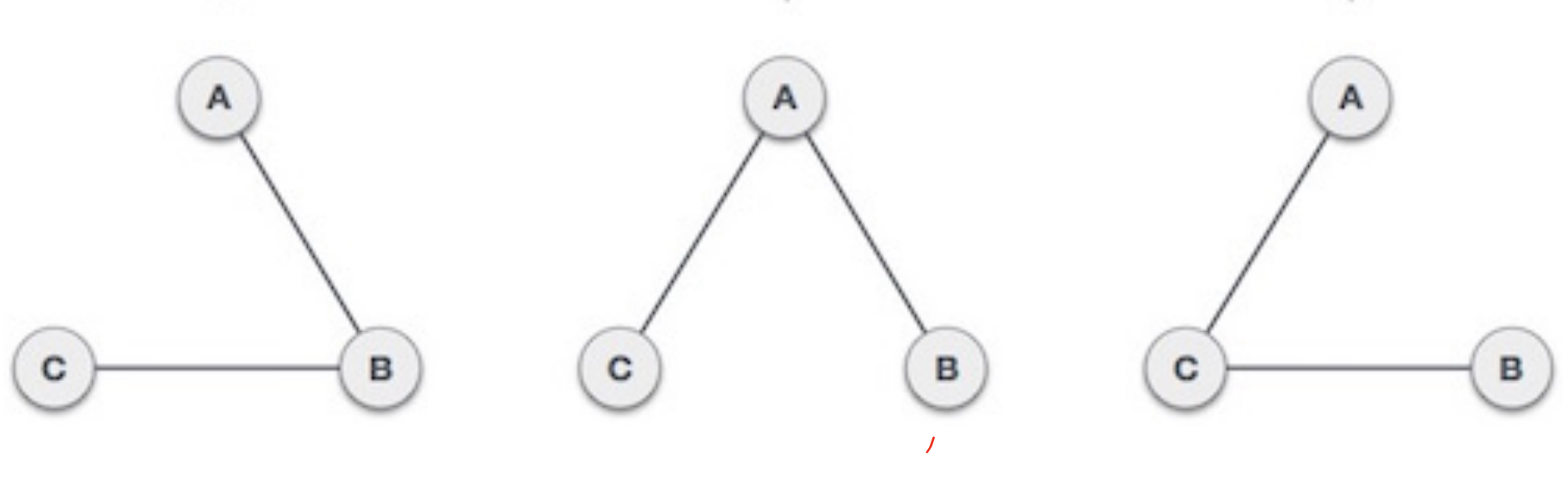
Spanning Tree

A spanning tree is a subset of Graph G, which has all the vertices covered with minimum possible number of edges. Hence, a spanning tree does not have cycles and it cannot be disconnected..





Spanning Trees



Properties of Spanning Tree

- A connected graph G can have more than one spanning tree.
- Spanning Tree has n-1 edges, where n is the number of Node (Vertices)
- All possible spanning trees of graph G, have the same number of edges and vertices.
- The spanning tree does not have any cycle (loops).
- Removing one edge from the spanning tree will make the graph disconnected, i.e. the spanning tree is minimally connected.
- Adding one edge to the spanning tree will create a circuit or loop, i.e. the spanning tree is maximally acyclic.

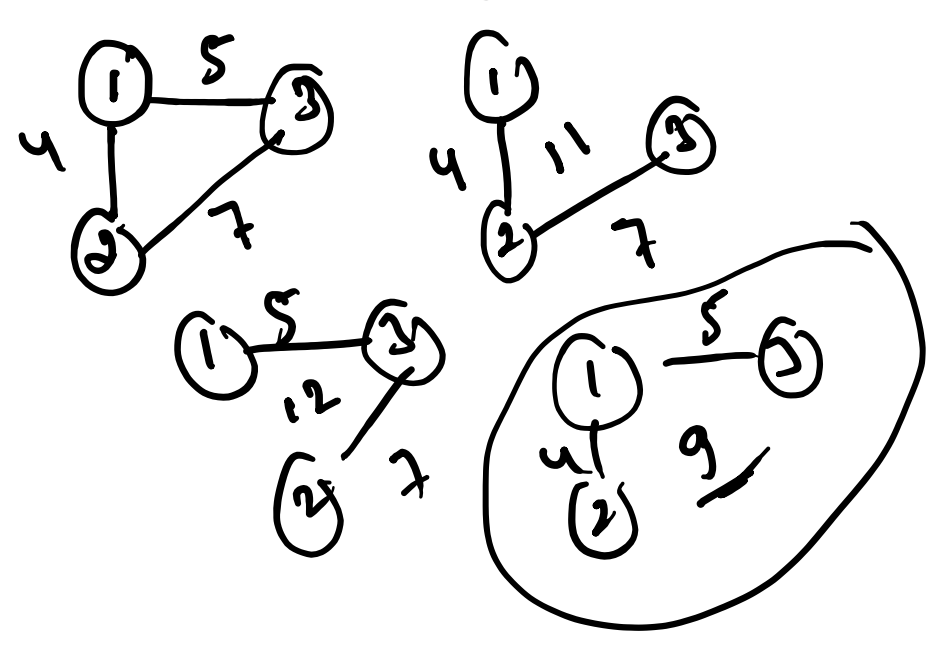
Minimum Spanning Tree (MST)

In a weighted graph, a minimum spanning tree is a spanning tree that has minimum weight than all other spanning trees of the same graph.

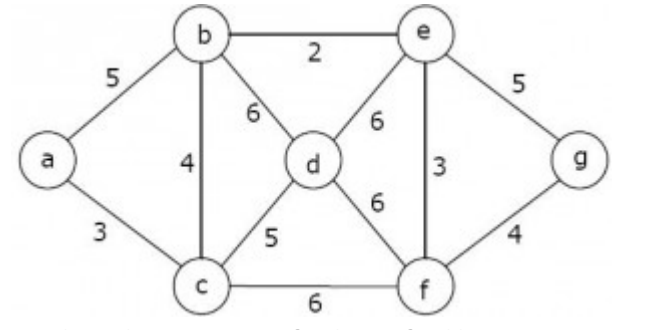
- Kruskal's Algorithm

Prim's Algorithm — Only

Both are greedy algorithms.

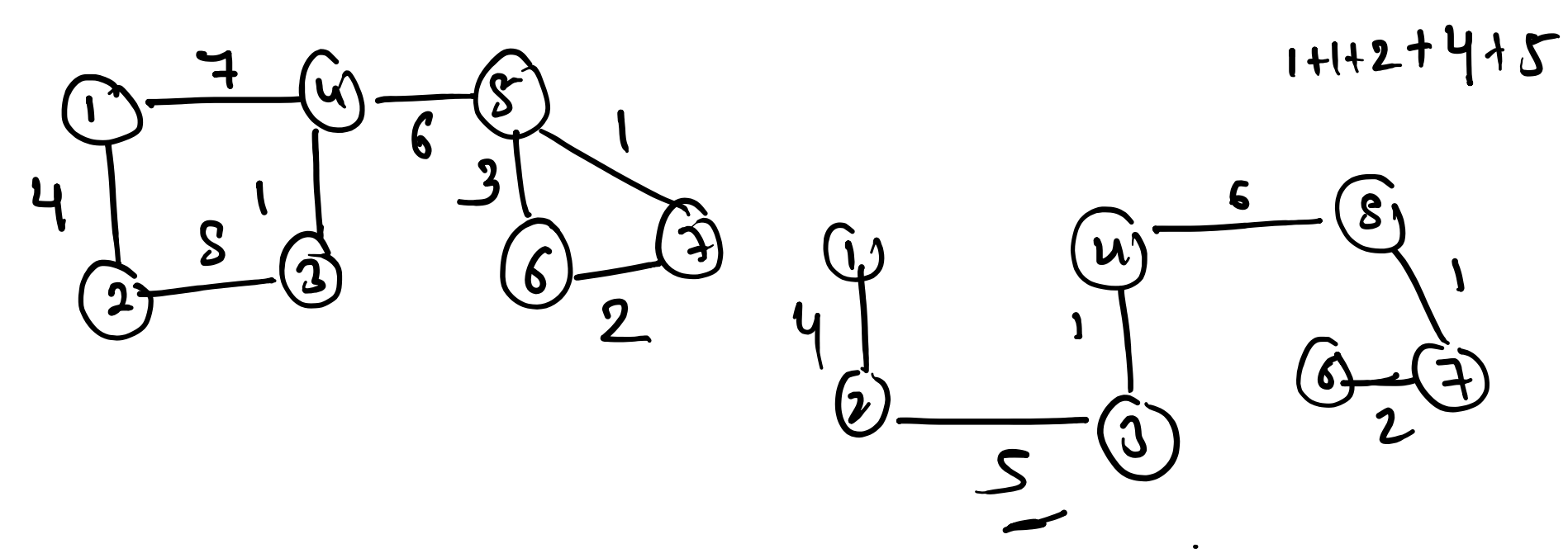


Consider the following graph:



Which one of the following is NOT the sequence of edges added to the minimum spanning tree using Kruskal's algorithm?

(A) (b,e)(e,f)(a,c)(b,c)(f,g)(c,d)
(B) (b,e)(e,f)(a,c)(f,g)(b,c)(c,d)
(C) (b,e)(a,c)(e,f)(b,c)(f,g)(c,d)
(D) (b,e)(e,f)(b,c)(a,c)(f,g)(c,d)

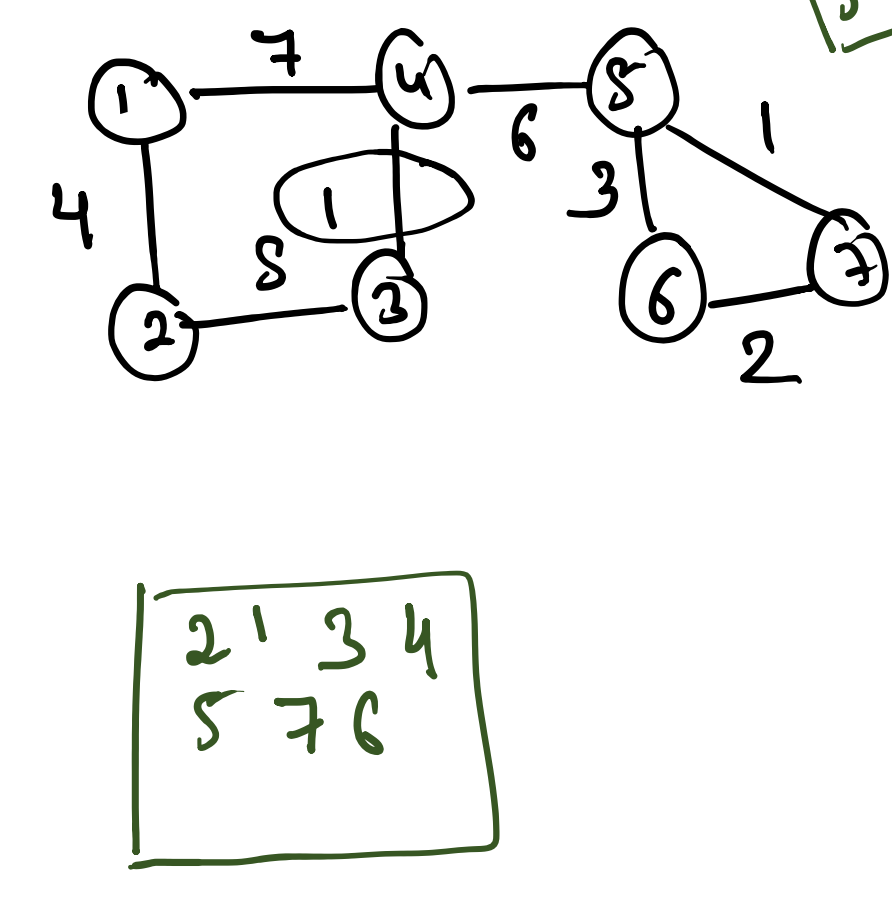


1+1+2+4+5+6 = 19

map.get(4)

map.get(1).get(3)

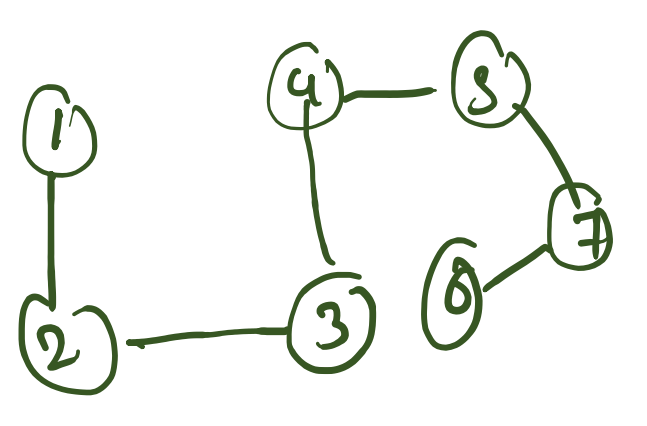
5 ✓



vtx	acq vtx	cost
~~2~~	~~2~~	~~0~~
~~3~~	~~2~~	~~5~~
~~1~~	~~2~~	~~4~~
~~4~~	~~1~~	~~7~~
~~4~~	~~3~~	~~1~~
~~5~~	~~4~~	~~6~~
~~6~~	~~5~~	~~3~~
~~7~~	~~5~~	~~1~~
~~6~~	~~7~~	~~2~~

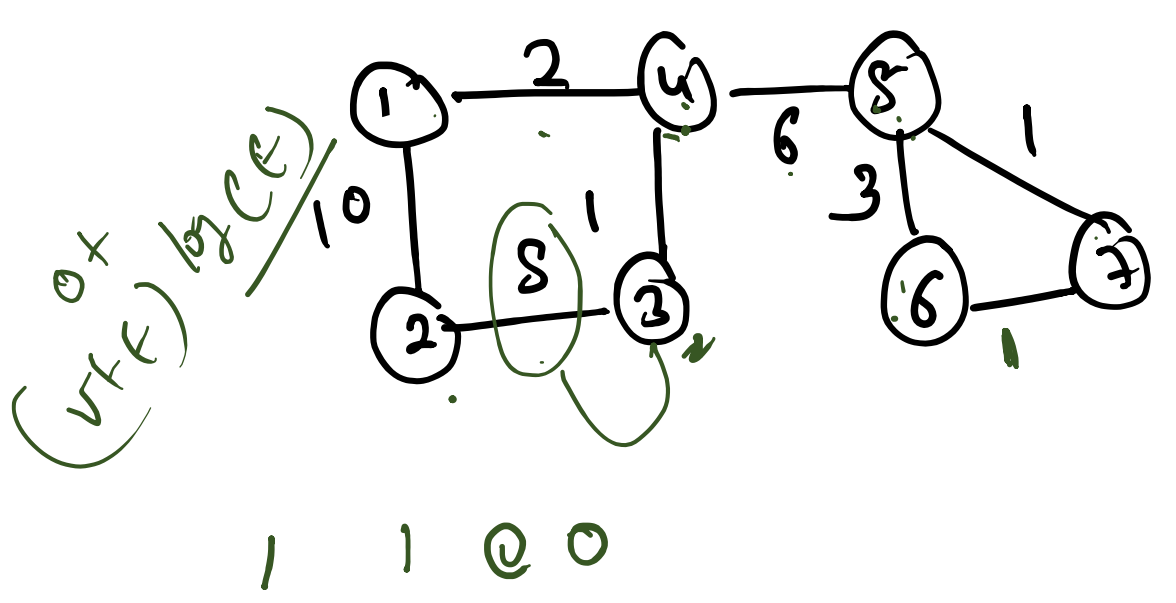
1. remove
2. ignore
3. marked visited
4. self work
5. Add nbrs

2 2 @ 0
1 2 @ 4
3 2 @ 5
4 3 @ 1
5 4 @ 6
7 5 @ 1
6 7 @ 2



2	1	3	4
5	7	6	

1 → 2 → mincost & path
1 → 3 ''
1 → 4 ''
1 → 5 ''
1 → 6 ''
1 → 7 ''



vtx	acq path	cost
~~1~~	~~1~~	~~0~~
~~2~~	~~12~~	~~10~~
~~4~~	~~14~~	~~2~~
~~3~~	~~143~~	~~3~~
~~5~~	~~145~~	~~8~~
~~2~~	~~1432~~	~~8~~
~~6~~	~~1456~~	~~11~~
~~7~~	~~1457~~	~~9~~
~~6~~	~~14576~~	~~10~~

1. remove
2. ignore
3. marked visited
4. self work
5. Add nbrs

1 1 @ 0
4 14 @ 2
3 143 @ 3
5 145 @ 8
2 1432 @ 8
7 1457 @ 9
6 14576 @ 10

1	2	4	3 5
2			
6			