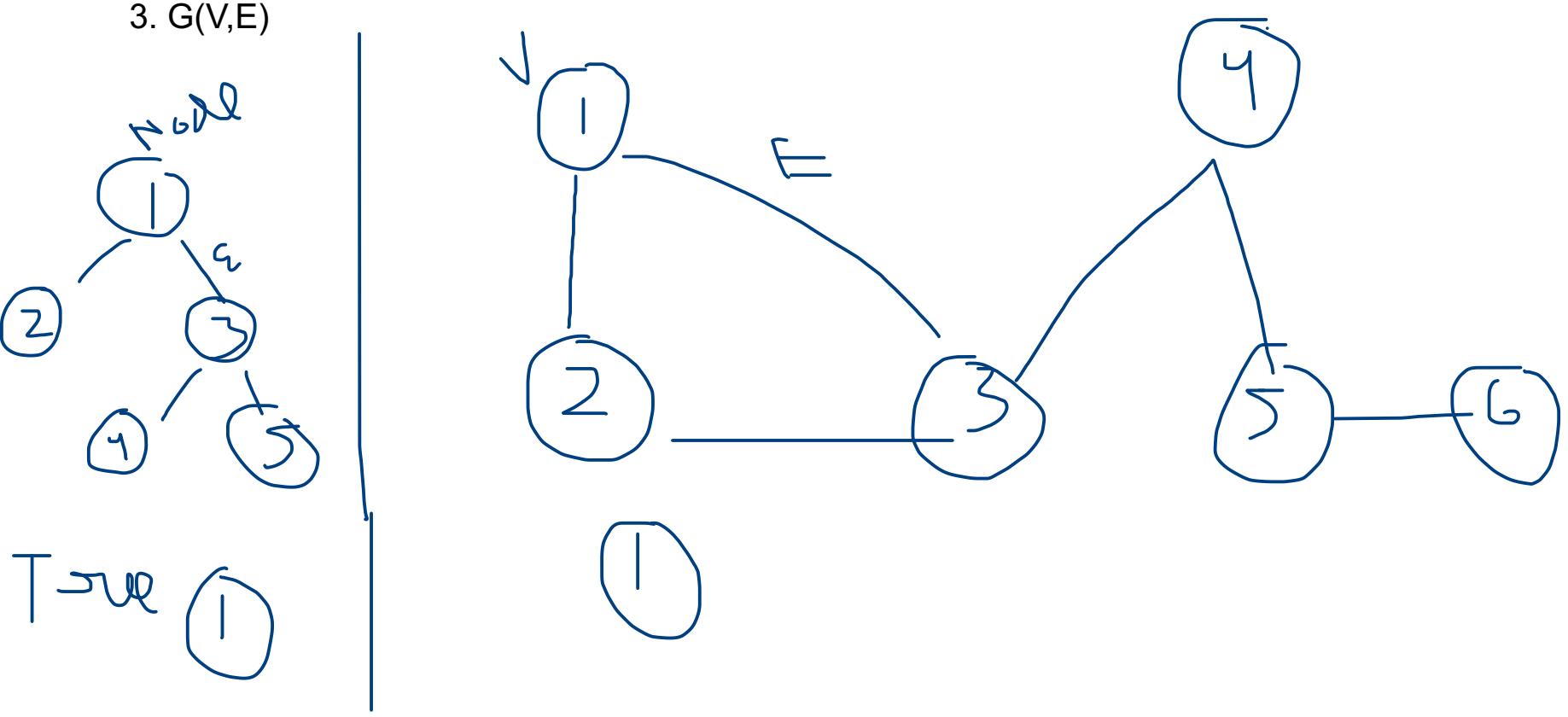
Graphs

1. Non Linear Data Structure

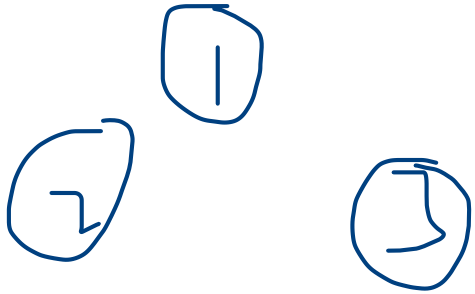
2. Vertices V & Edges E

3. G(V,E)

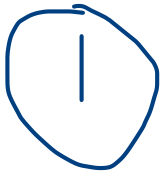


Types of Graph

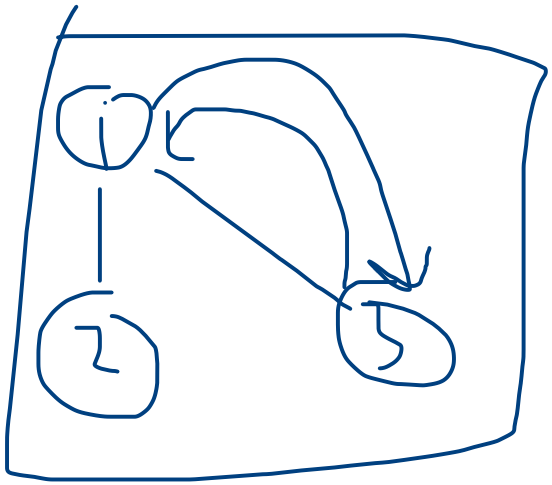
a. Null Graph: No Edges in Graph

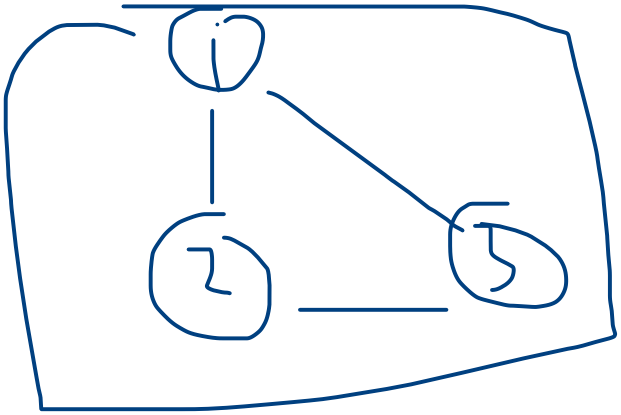


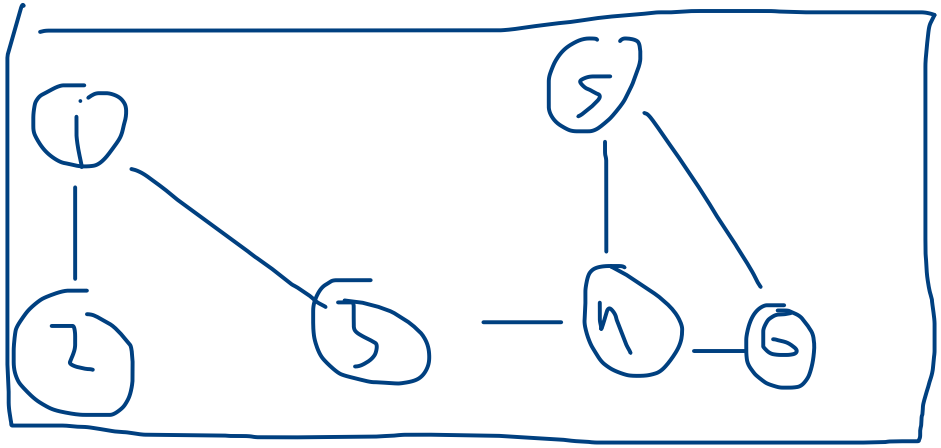
b Trivial Graph

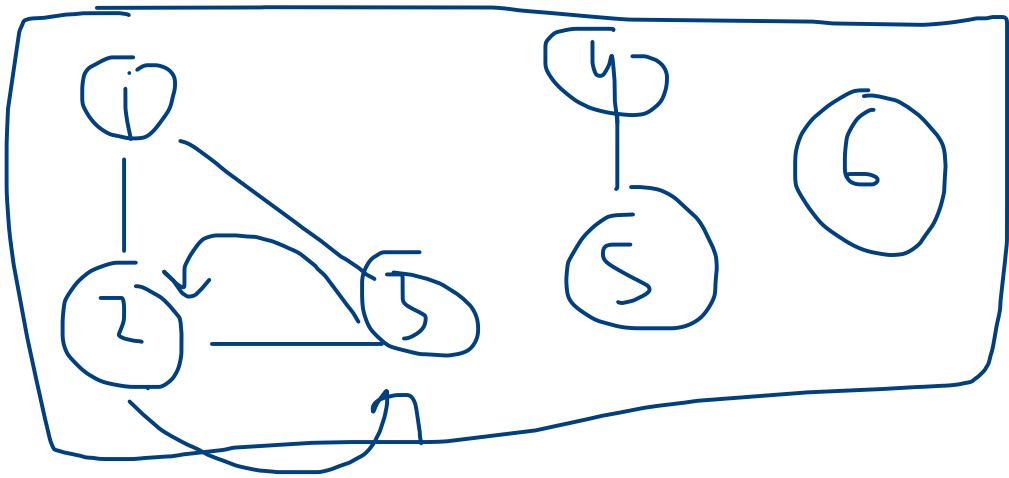


3 Undirected Graph

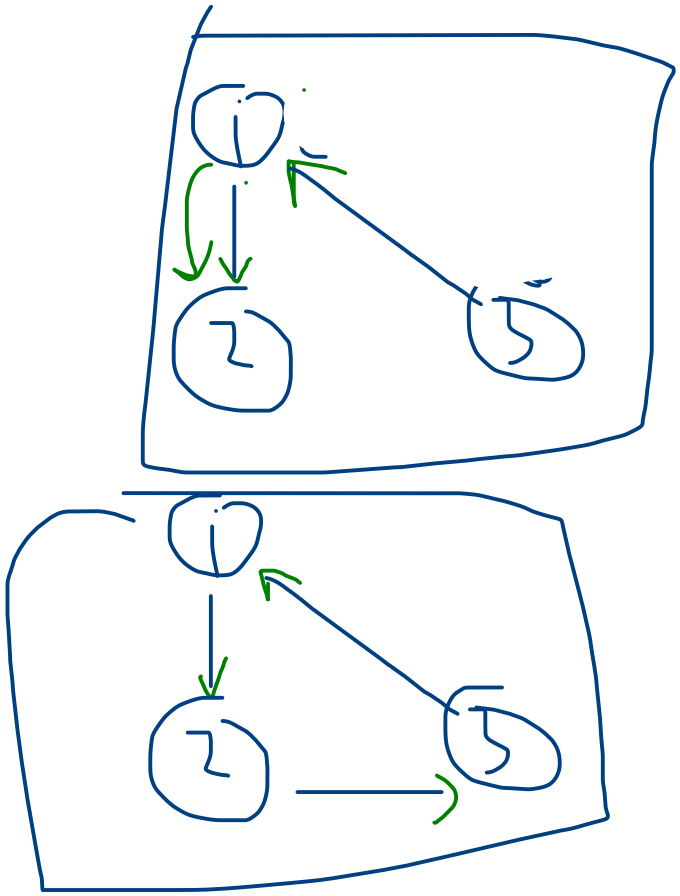


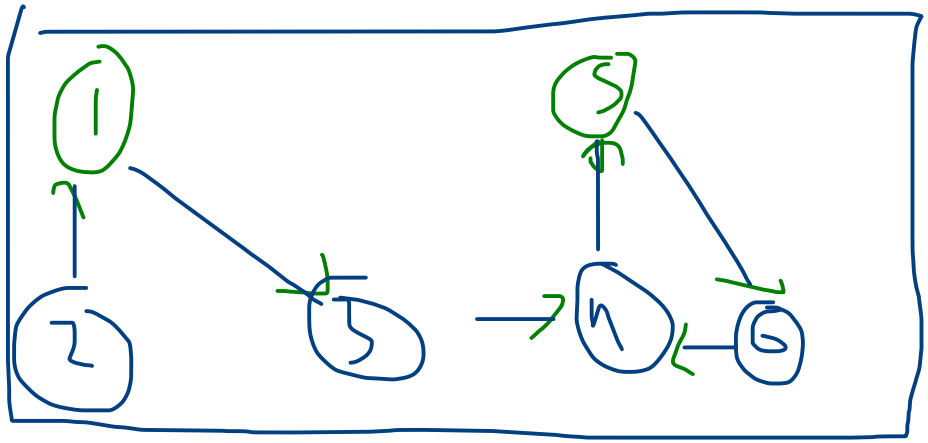


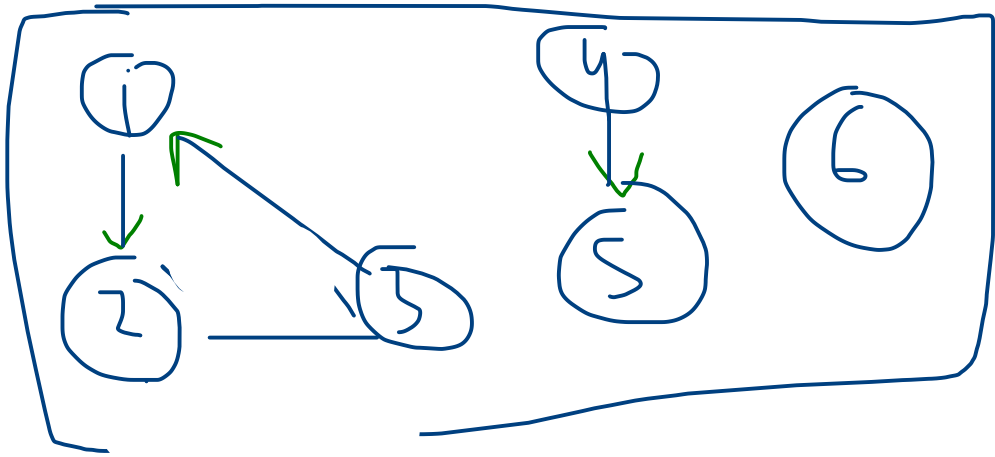




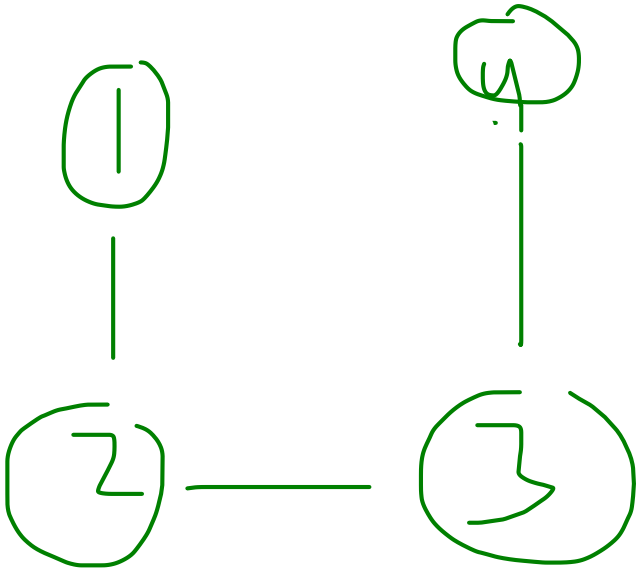
4. Directed Graph



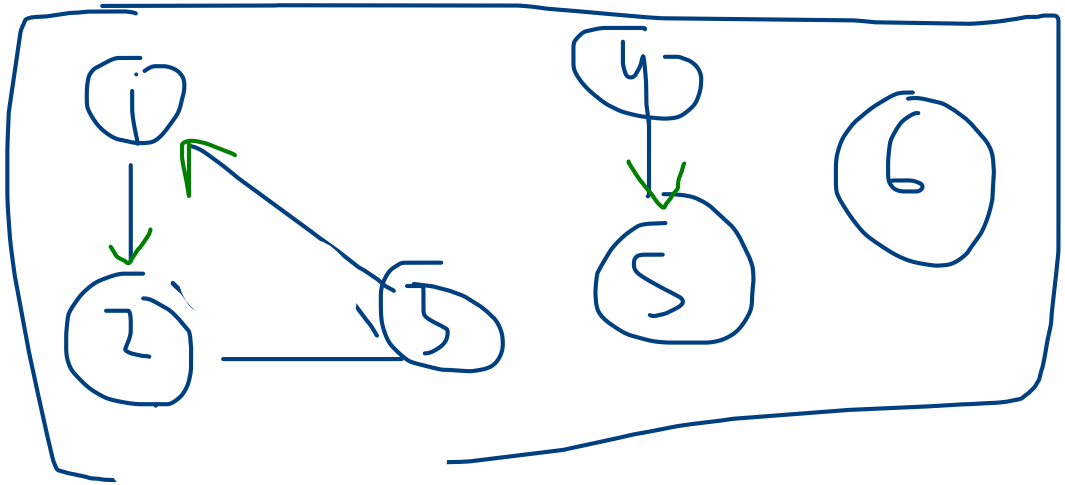




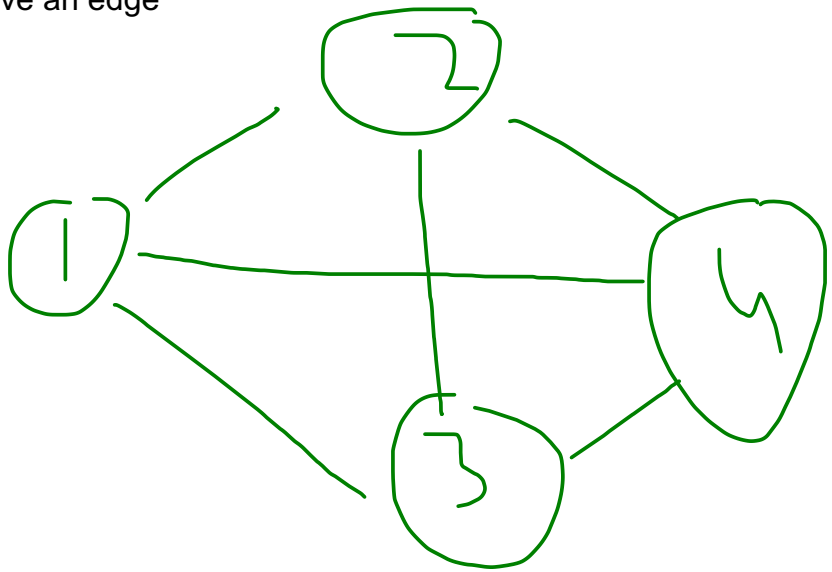
5. Connected Graph



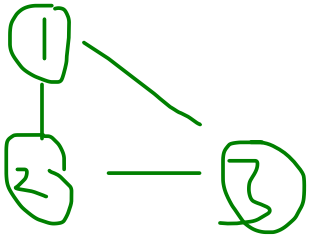
7. Disconnected Graph



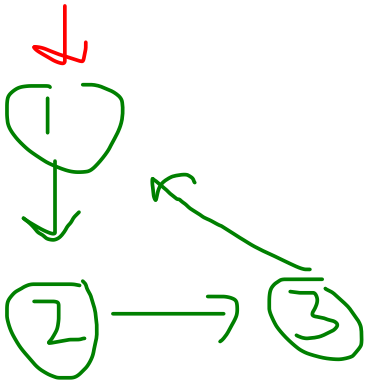
8. Complete Graph: Every Two node have an edge



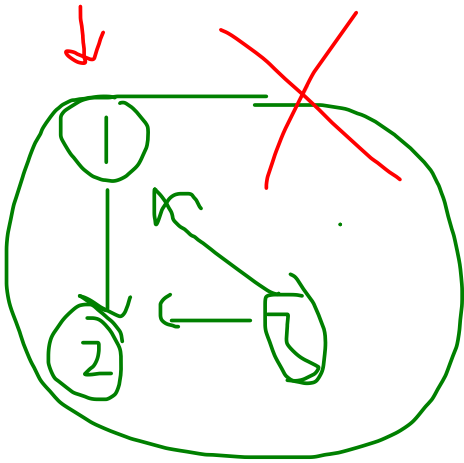
9. Cyclic Graph



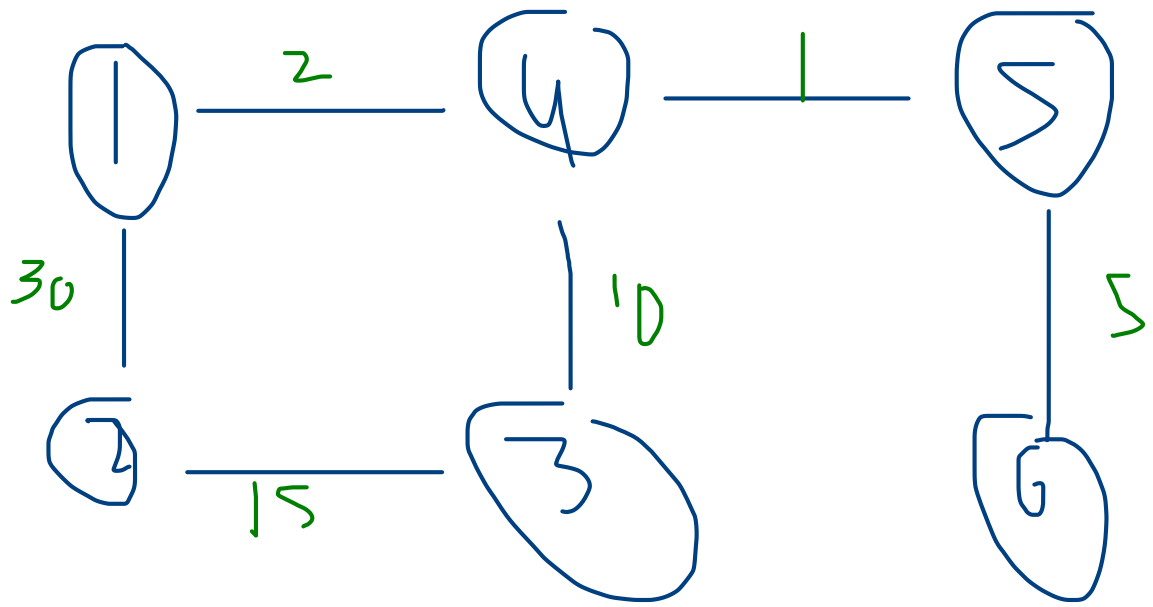
Directed cyclic Graph



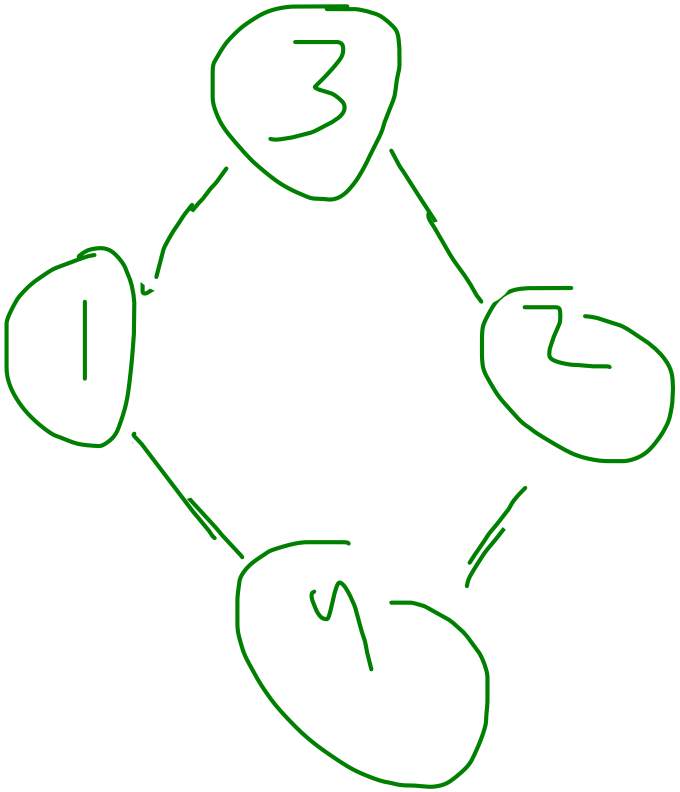
Directed Acyclic Graph

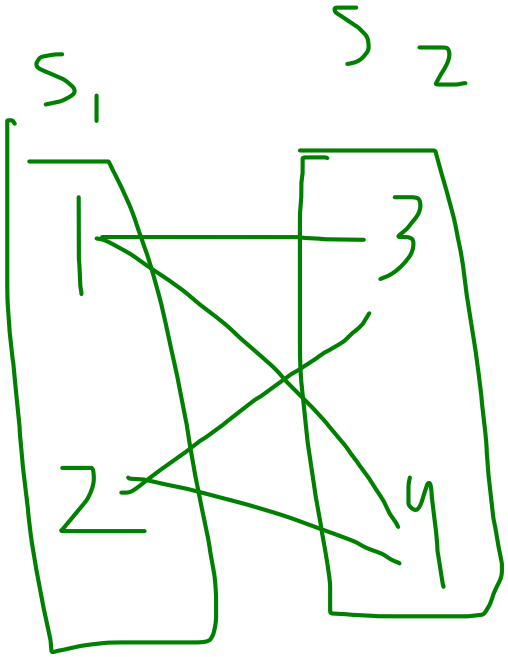


10 Weighted Graph: Edges have some weights



11. Bipartite Graph- Vertex is divided into two sets, ie, vetrices in each sets does not contain any edge between them

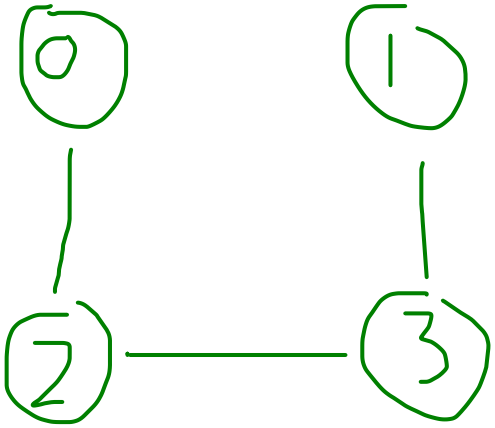




Representation of Graph

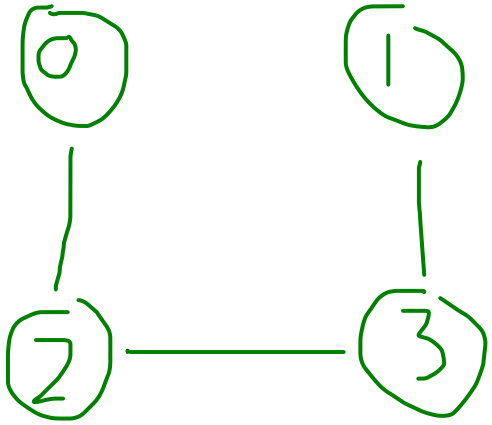
1. Adjacency Matrix
2. Adjacency List

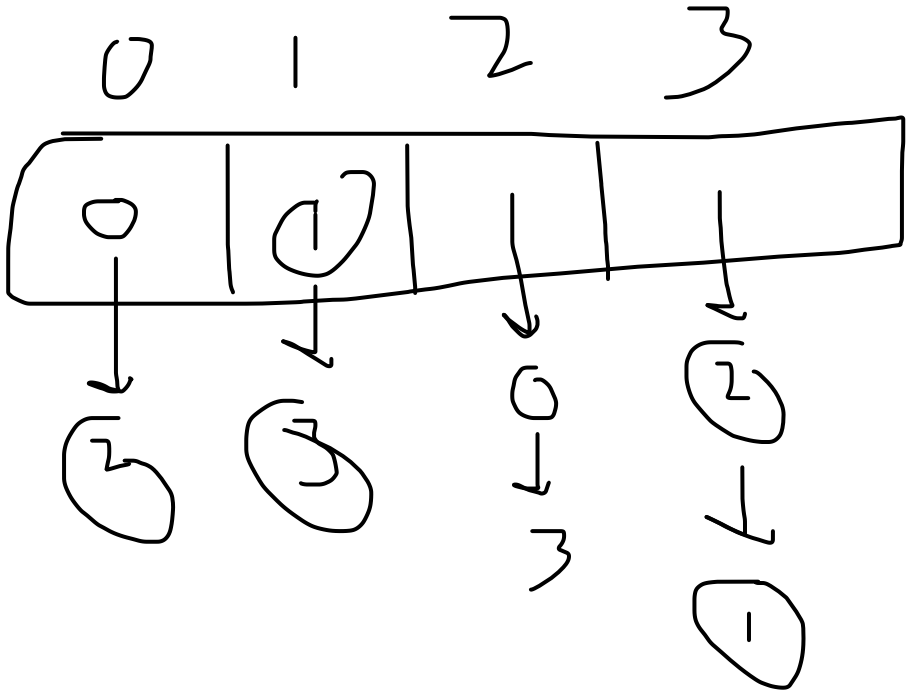
1. Adjacency Matrix



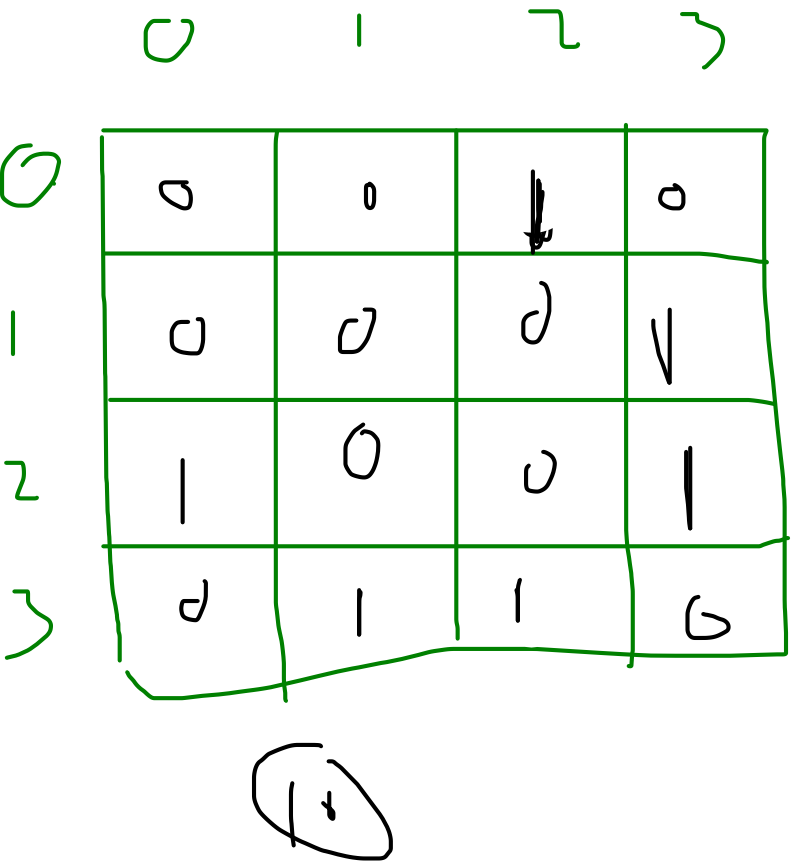
	0	1	2	3
0	0	0	1	0
1	0	0	0	1
2	1	0	0	1
3	0	1	1	0

2. Adjacency List





Adjacency
Matrix vs List

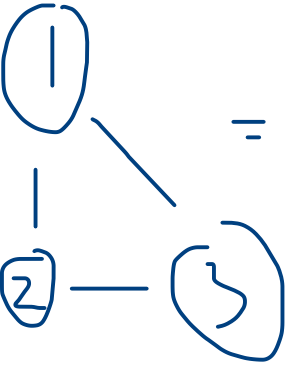


sparse matrix--> more no. of zeros

1. Make Graph
2. Searching in Graph
3. Traversals Graph

Count Graphs

Maximum No. of Edge in N vertices = N * (N - 1) / 2 = x = 3



$= {}^{3}C_0 \quad {}^{3}C_1 \quad {}^{3}C_2 \quad {}^{3}C_3$

Total no of graph with 0 Edge = 1

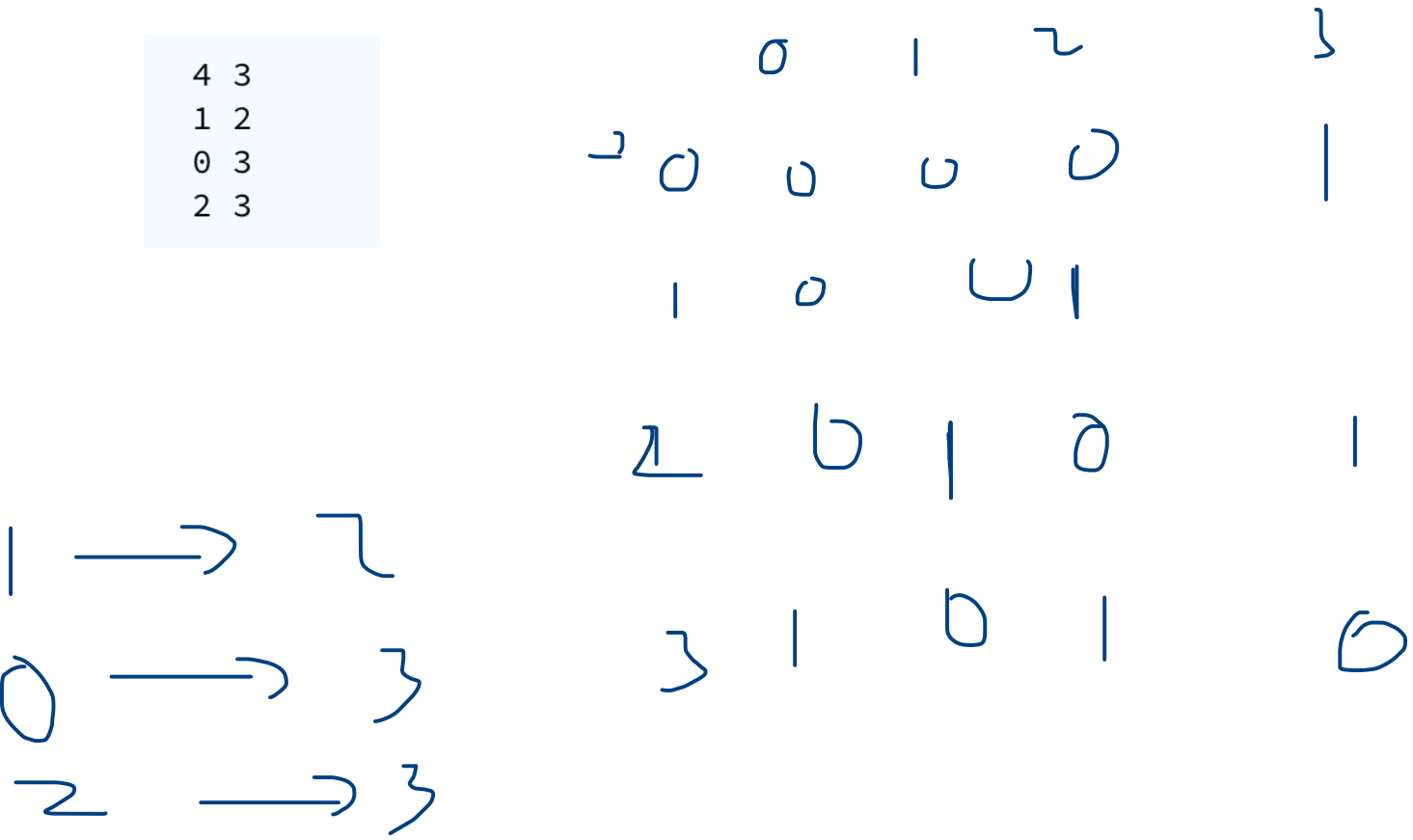
Total no of graph with 1 Edge = 3

1
2
3

$${}^{x}C_0 + {}^{x}C_1 + {}^{x}C_2 + {}^{x}C_3 + \dots + {}^{x}C_x = 2^x$$

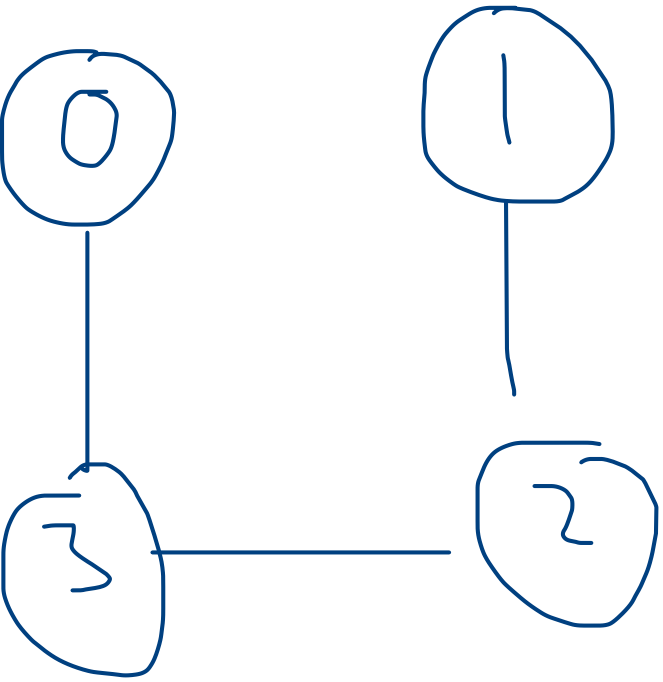
Graph Representation (Adjacency Matrix)

```
4 3
1 2
0 3
2 3
```



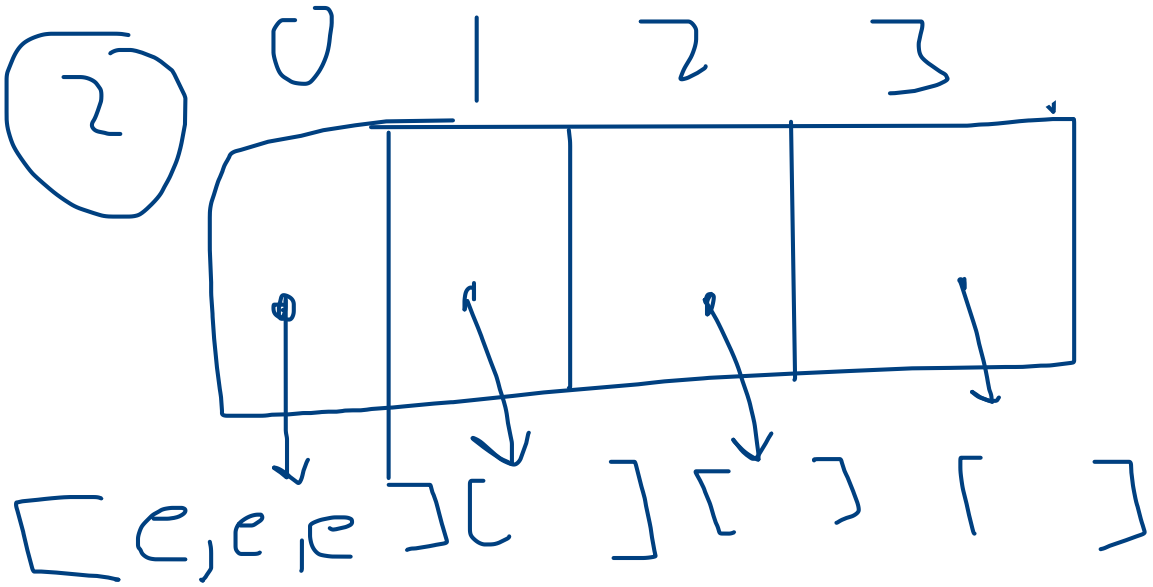
Graph Representation (Adjacency list)

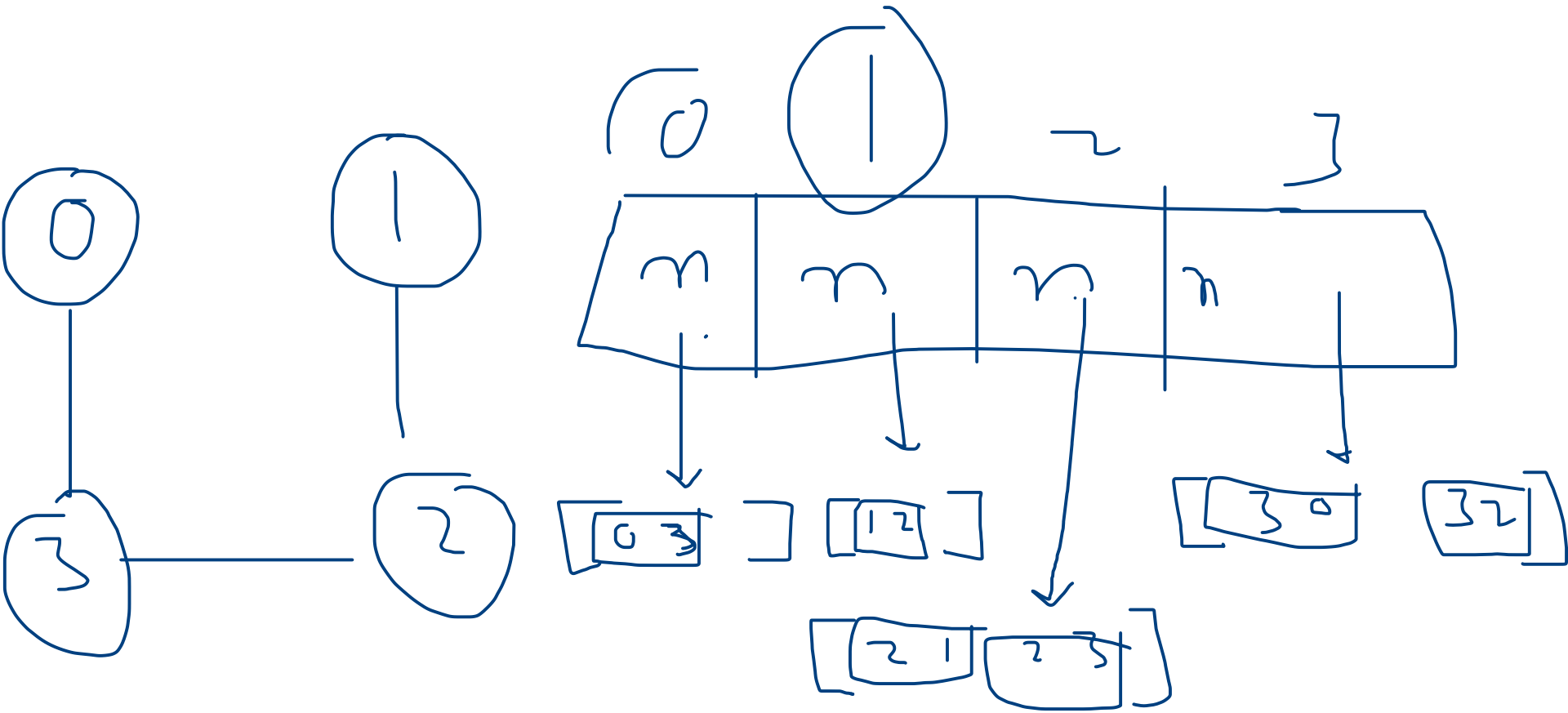
Edge Class

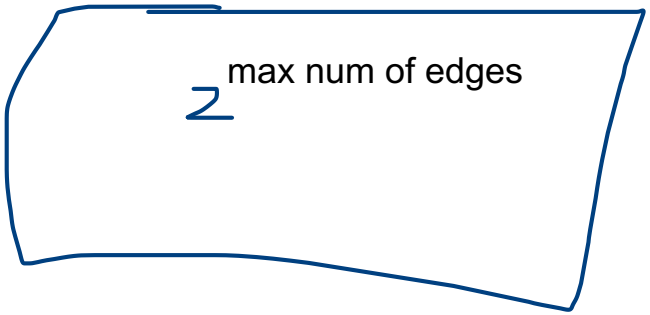


ArrayList<Edge>[] graph

Array of Arraylist of Edge






max num of edges
2