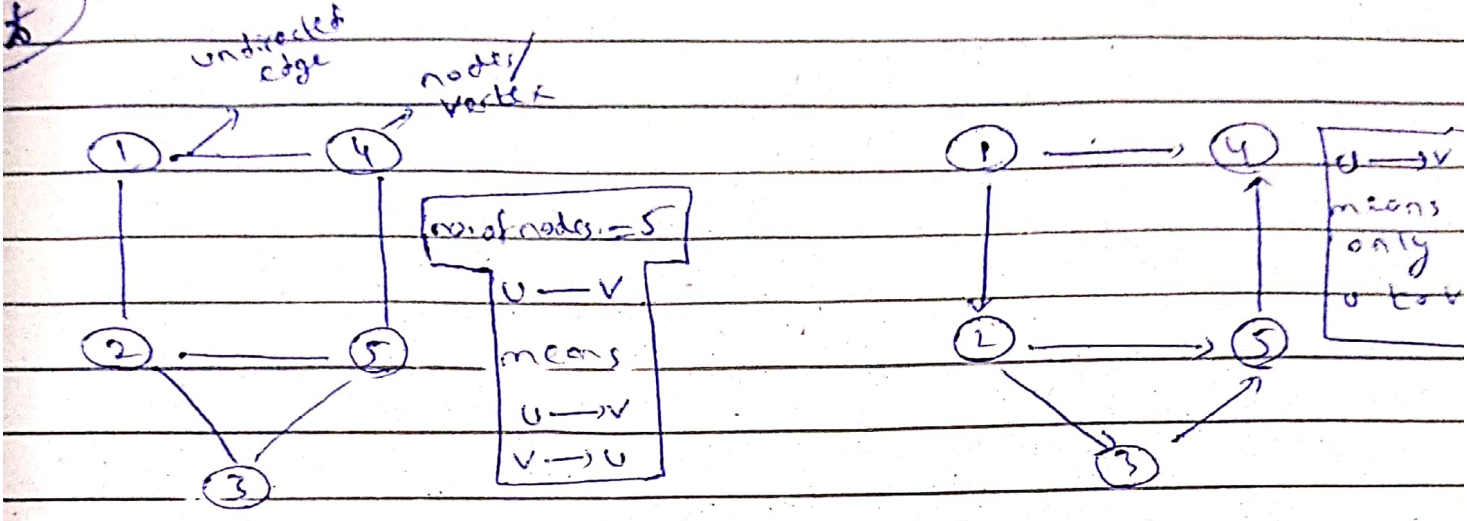
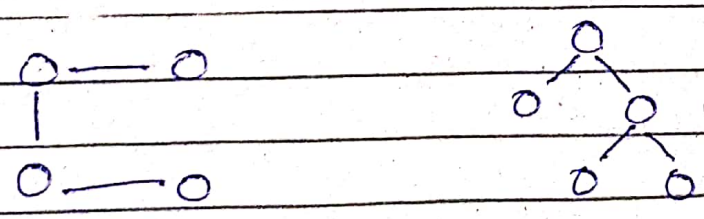
Introduction To Graphs
Types and different Conventions



Undirected Graph
(Edges are Undirected)

Directed Graph
(Edges are Directed)

Cycles in a Graph :-

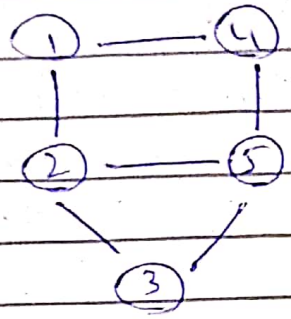


⇒ Both are graphs, A tree can also be called a graph because it follows both conditions of
- → Having node and vertex
- → Having edges

⇒ Graph can be enclosed in a cycle or it cannot (as shown in 2 figures).

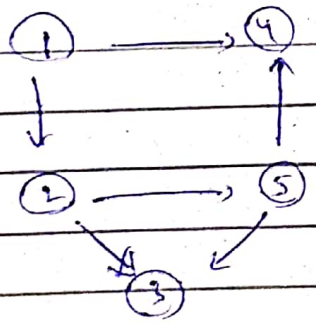
⇒ A cycle is basically starting and ending at same node or vertex.

Following is an undirected cyclic graph:-



Undirected cyclic graph bcz we can start from first node(1) and come back to same node.

Following is not a directed cyclic graph:-

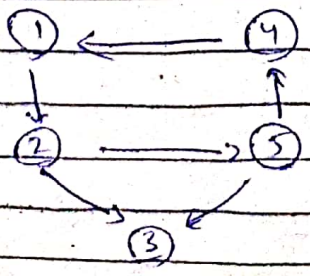


Directed Acyclic Graph

Directed Acyclic Graph bcz we do not see a cycle in here.
We are starting at (1) lets say but we are not ending at (1). Same is for (2).

So starting at some node and ending there is important in order to have cyclic property in graph

If I add one edge in here then it'll be a cyclic graph.

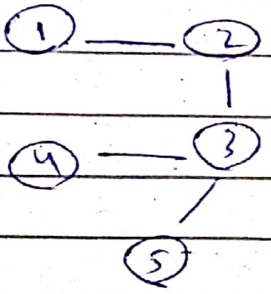


Directed cyclic Graph bcz it has 1 cycle in here.

*) Path

→ Contain a lot of vertices or nodes

→ Each of them are reachable



*) Path can be something like

1 2 3 5

or

1 2 3 4

But it cannot be something like

1 2 3 2 1

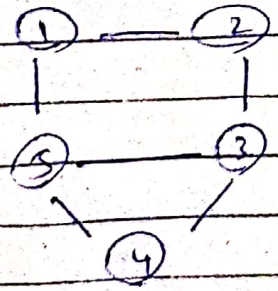
Because a node can only appear once in a path

*) Adjacent nodes must have edge in them like in 1235 1 and 2 have edge, 2 and 3 have edge, 3 and 5 have edge.

*) Degrees in a Graph:

In Undirected Case

→ Degree is the no of edges that goes inside or outside of the node.



Degree(3):- Degree of node 3 is 3 bcz 3 edges are going in and out of it.

D(4) → 2

D(1) → 2

Total degree of graph = 2 x (No. of edges)

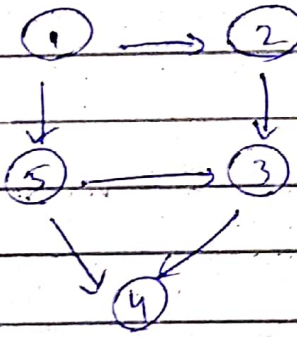
$D(1) + D(2) + D(3) + D(4) + D(5) = 2 \times 6$

$2 + 2 + 3 + 2 + 3 = 12$

$12 = 12$

↳ Because Every edge is connected to 2 nodes.

In case of Directed Graph



There are two things in here
*) Indegree
*) Out Degree

Indegree(3) ⟶ 2

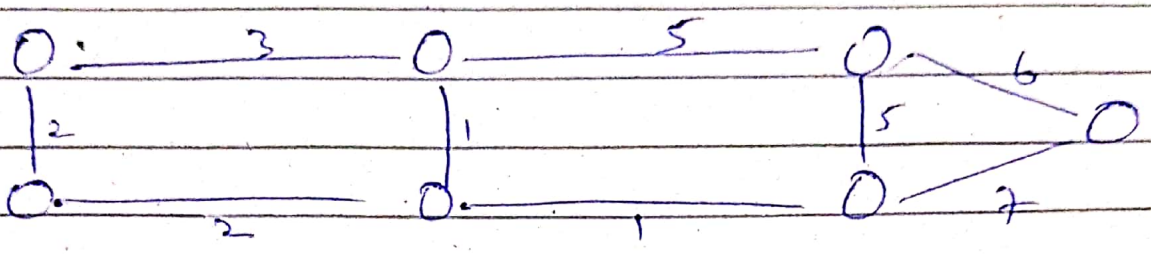
Outdegree(3) ⟶ 1

Explanation :

↳ Indegree of node 3 is 2 because 2 edges are coming inside.

↳ Outdegree of node 3 is 1 because only 1 edge is going out of it.

4) Edge Weight :-



These are all the weights on the edges. If the weights are not assigned then unit weight is considered which is 1.