19CSE337 Social Networking Security

Lecture 4

Topics to Discuss

- Types of Graphs

Null Graph

- These are the graphs which do not contain any edges.
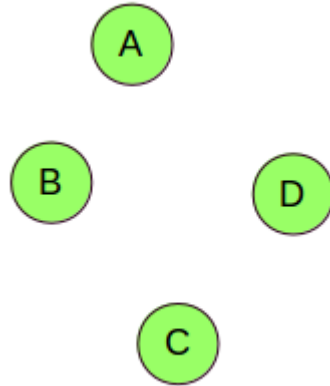
Trivial Graph

- A **trivial graph** is the graph which has only one vertex.

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Simple Graph

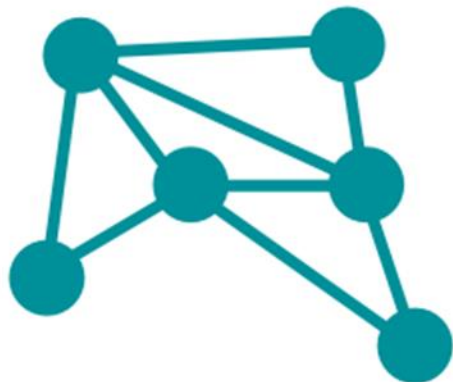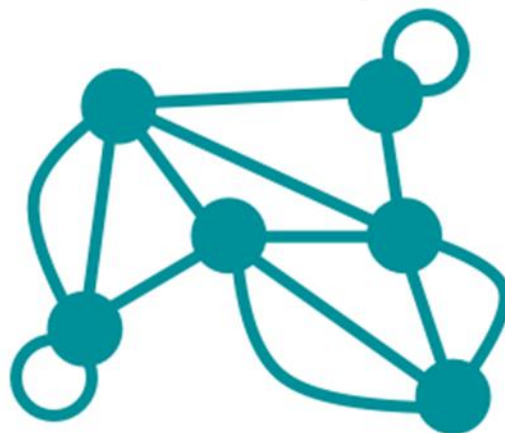- A **simple graph** is the undirected graph with **no parallel edges** and **no loops**.

Multi-Graph

- A graph in which there are multiple edges between any pair of vertices or there are loops and parallel edges.
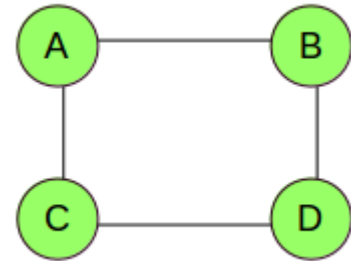
Simple Graph

Multigraph

Un-Directed Graph
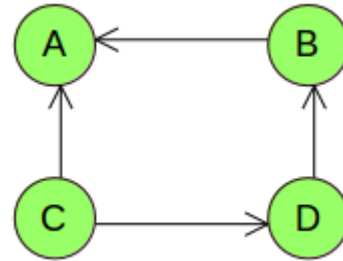
- These are the graphs which have edges, but these edges do not have any direction.

- Also called non-directed graph.

Directed Graph

- When the edges of a graph have a specific direction, they are called directed graphs.

- Also known as digraphs.

- Consider the example of Facebook and Twitter connections.

- When you add someone to your friend list on Facebook, you will also be added to their friend list.

- This is a two-way relationship, and that connection graph will be a non-directed one.

- Whereas if you follow a person on Twitter, that person might not follow you back. This is a directed graph.

Weighted Graph

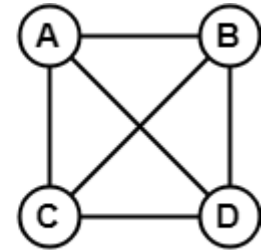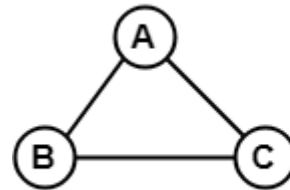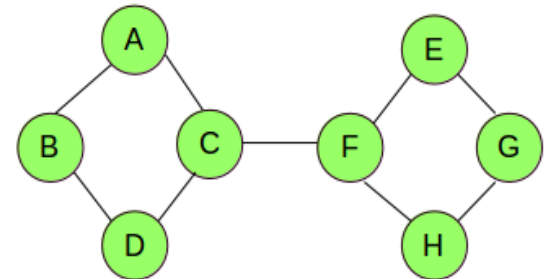- A graph in which each edge is labelled with a numerical weight or cost.
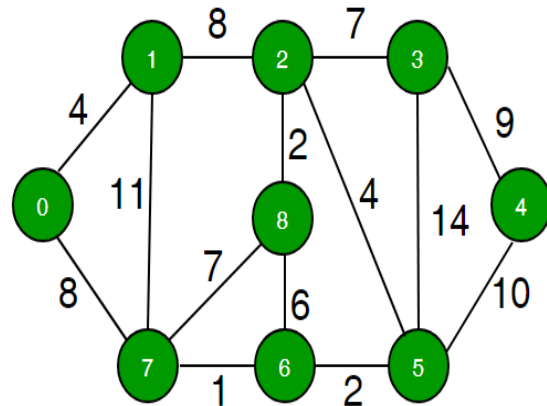
Complete Graph

- A graph in which every pair of vertices is joined by exactly one edge is called **complete graph**. It contains all possible edges.
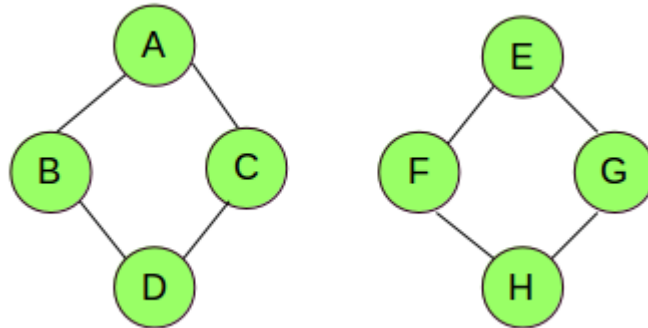
Connected Graph

- A **connected graph** is a graph in which we can visit from any one vertex to any other vertex.

- In a connected graph, at least one edge or path exists between every pair of vertices.

Disconnected Graph

- These are those graphs which have unreachable vertex(s), i.e., a path does not exist between every pair of vertices.

- Connectivity of a graph help to know whether there is a path exists or not.

- We can take an airline network example.

- Connectivity between networks/graphs can help to decide whether all the airports are connected or not.

- They can visualize the connections, and if there is any unconnected airport, new flights can be introduced to improve on the existing situation.

Regular Graph

- When all the vertices in a graph have the same degree, these graphs are called k-Regular graphs (where k is the degree of any vertex). Consider the two graphs given.

- For Graph – 1, the degree of each vertex is 2, hence Graph – 1 is a regular graph. Graph-2 is not a regular graph as the degree of each vertex is not the same (for A and D degree is 3, while for B and D it's 2).
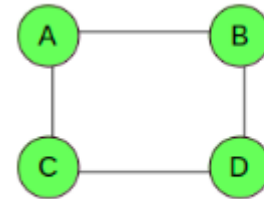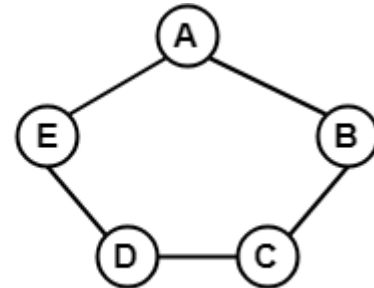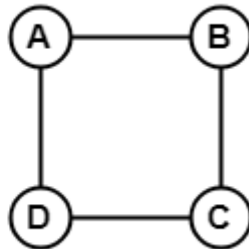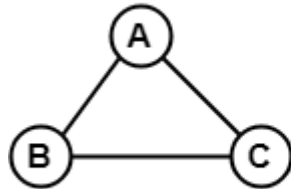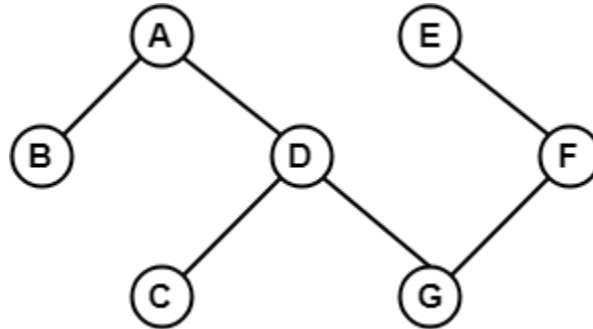

Graph - 1   Graph - 2
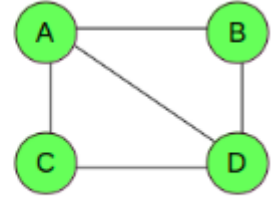
Cyclic Graph

- A graph containing at least one cycle in it is known as a **cyclic graph**.

- In the cycle graph, degree of each vertex is 2.

Acyclic Graph

- A graph which does not contain any cycle in it is called as an **acyclic graph**.
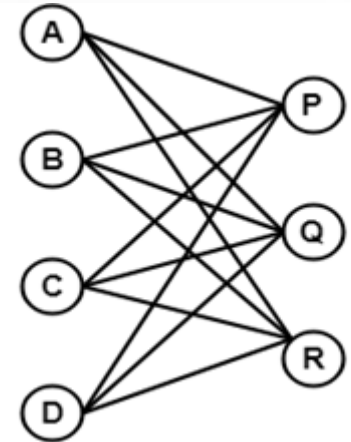
Bipartite Graph

- A **bipartite graph** is a graph in which the vertex set can be partitioned into two sets such that edges only go between sets, not within them.

- A graph G (V, E) is called bipartite graph if its vertex-set V(G) can be decomposed into two non-empty disjoint subsets V1(G) and V2(G) in such a way that each edge e ∈ E(G) has its one end point in V1(G) and other end point in V2(G).

- The partition V = V1 ∪ V2 is known as bipartition of G.
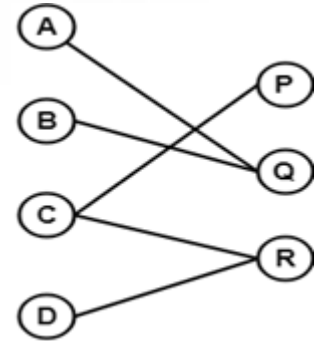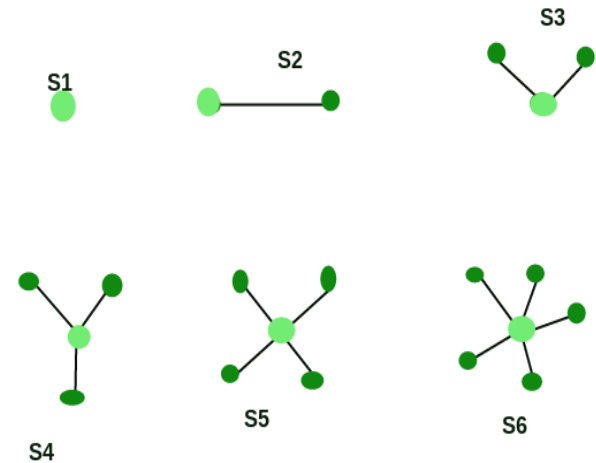
Complete Bipartite Graph

- A **complete bipartite graph** is a bipartite graph in which each vertex in the first set is joined to each vertex in the second set by exactly one edge.

- A complete bipartite graph is a bipartite graph which is complete.

Star Graph

- A star graph is a complete bipartite graph in which n-1 vertices have degree 1 and a single vertex have degree (n -1). This exactly looks like a star where (n - 1) vertices are connected to a single central vertex.

S1   S2   S3
S4   S5   S6

Star Graph of order-n (Sn)

Thanks...........