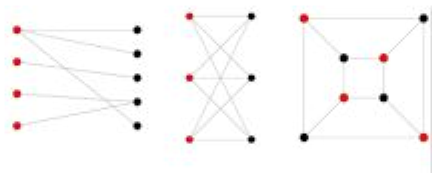
Graph MCQ:

What is the number of edges present in a complete graph having n vertices?
Ans: Each vertex is connected to all other vertices: (n*(n-1))/2

Regular Graph:
In **graph** theory, a **regular graph** is a **graph** where each vertex has the same number of neighbors; i.e. every vertex has the same degree or valency. A **regular** directed **graph** must also satisfy the stronger condition that the indegree and outdegree of each vertex are equal to each other.

Euler's formula:
By euler's formula the relation between vertices(n), edges(q) and regions(r) is given by n-q+r=2.

Bipartite Graph:
A **bipartite graph**, also called a bigraph, is a set of **graph** vertices decomposed into two disjoint sets such that no two **graph** vertices within the same set are adjacent. A **bipartite graph** is a special case of a k-partite **graph** with.



What is the maximum number of edges in a bipartite graph having 10 vertices?
Let one set have n vertices another set would contain (10 - n) vertices. The total number of edges would be n * (10 - n). So the answer is 25.

For an undirected graph G with n vertices and e edges, the sum of the degrees of each vertex is: 2e

A complete graph can have: n^(n-2) spanning trees, where n is the number of vertices

A **spanning tree** *T* of an undirected graph *G* is a subgraph that is a tree which includes all of the vertices of *G*, with the minimum possible number of edges. In general, a graph may have several spanning trees, but a graph that is not connected will not contain a spanning tree.

The spanning tree of a connected graph with 10 vertices contains: 9 edges

If the locality is a concern, you can use Depth First Search **to traverse the graph. Not BFS.**

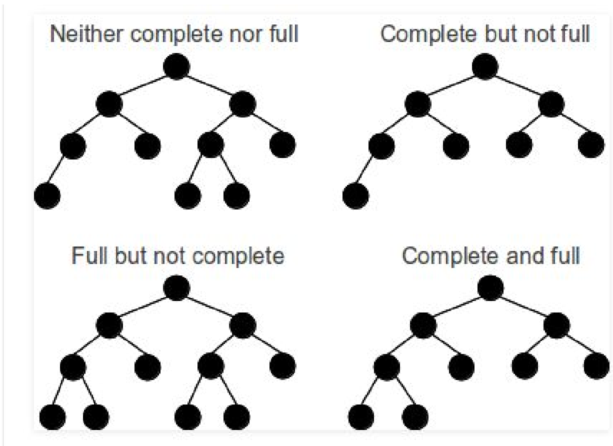
Which of the following algorithms solves the all-pairs shortest path problem?
Floyd's algorithm

BFS: Queue **DFS:** Stack

Full vs Complete Binary Tree:

A full binary tree (sometimes proper binary tree or 2-tree) is a tree in which every node other than the leaves has two children.

A complete binary tree is a binary tree in which every level, except possibly the last, is completely filled, and all nodes are as far left as possible.

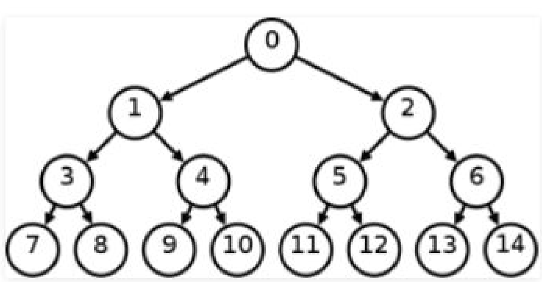


In a Full Binary, number of leaf nodes is the number of internal nodes plus 1
Mathematically,

L = I + 1
Where,
L = Number of leaf nodes
I = Number of internal nodes

Perfect Binary Tree:

A Binary tree is a Perfect Binary Tree in which all internal nodes have two children.
Hence, all leaves are at the same level.
A Perfect Binary Tree of height, h has $2^h - 1$ nodes.



The depth of a complete binary tree of n nodes will be Dn=log 2 (n+1). Here Dn is the height or depth of the tree and n is the number of nodes.

Balanced Binary Tree:

A binary tree is balanced if the height of the tree is O(Log n) where n is the number of nodes.

AVL trees maintain O(Log n) height by making sure that the difference between heights of left and right subtrees for any node is 1, -1 or 0.
Red-Black trees maintain O(Log n) height by making sure that the number of Black nodes on every root to leaf paths are same and there are no adjacent red nodes.
Balanced Binary Search trees are good performance wise as they support O(log n) time for search, insert and delete operations.

Given an undirected graph with negative edge weights, will Dijkstra's algorithm find the shortest path between two nodes correctly? No.