What is a Bipartite Graph?

Now, we'll be introduced to a unique graph called the bipartite graph. We will also take a look at some examples to understand the concept better.

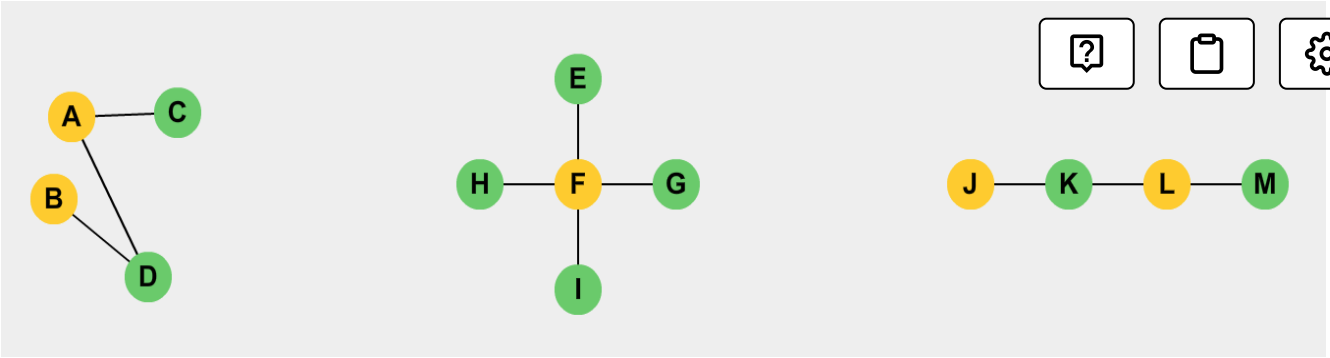
We'll cover the following

Introduction

The **bipartite graph** is a special member of the graph family. The vertices of this graph are divided into two disjoint parts in such a way that no two vertices in the same part are adjacent to each other.

The bipartite graph is a type of **k-partite graph** where **k** is 2. In a 5-partite graph, we would have 5 disjoint sets and members of a set would not be adjacent to each other.

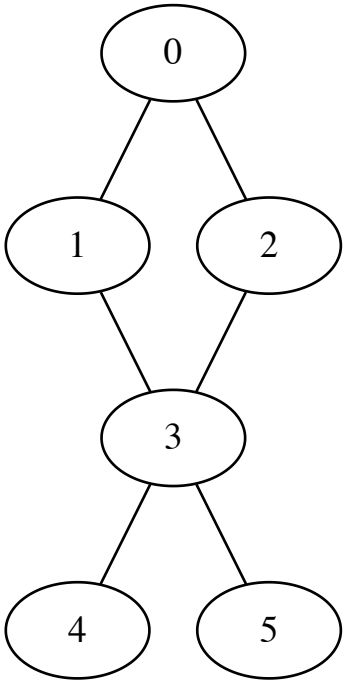
To understand bipartite graphs better, have a look at the examples below:



bipartite graphs

Can a cyclic graph be bi-partite?#

A **cyclic** graph is one in which the edges form a cycle between the vertices. If you traverse a cyclic graph, you would come back to a vertex which you have already visited. Here's an example:



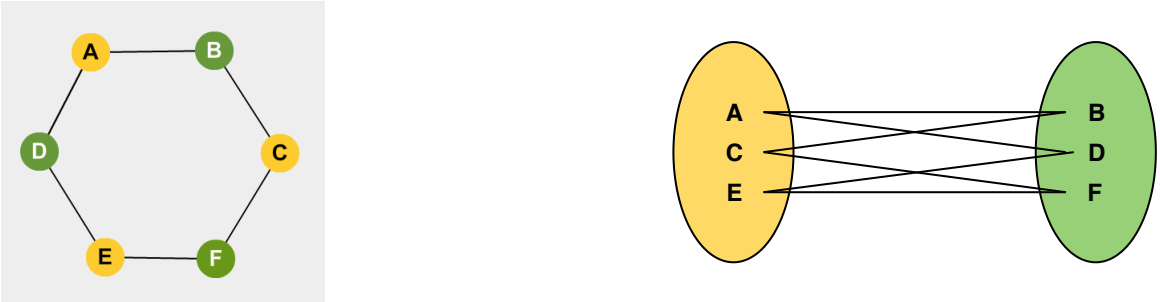
A cyclic graph

The question arises, can a cyclic graph be a bipartite graph?

Yes it can.

In the illustration below, you can see that the graph has an even number of nodes, which means that they can be divided into two disjoint sets having non-adjacent vertices.

If there were an odd number of vertices, the nodes could never be divided into two disjoint and non-adjacent sets.



Graph with even number of nodes (on the left) can be divided into two disjoint sets (on the right)

This brings us to an interesting observation:

> All the **acyclic** graphs can be bi-partite, but in the case of **cyclic** graphs, they must contain an even number of vertices.

Types of bipartite graphs

Some popular types of bipartite graphs are:

- Star Graph
- Acyclic Graph
- Path Graph

In the next lesson, we will move on to graph traversal and take a look at two famous graph algorithms.

Back

Complexities of Graph Operations

Next

Graph Traversal Algorithms

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