Graph connectivity

Matching Problems

Matching in a graph

Given an **undirected graph**, a **matching** is a set of edges, such that no two edges share the same vertex.

In other words, matching of a graph is a subgraph where each node of the subgraph has either **zero or one edge** incident to it.

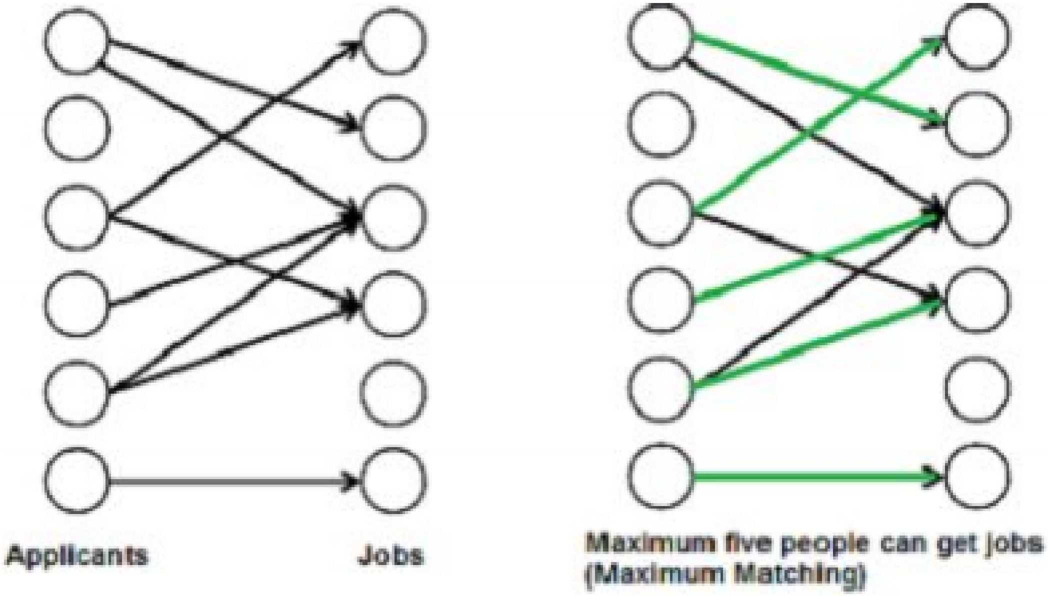
Let ‘G’ = (V, E) be a graph. A subgraph is called a matching M(G), if each vertex of G is incident with at most one edge in M, i.e.,

$\deg(V) \leq 1 \ \forall \ V \in G$

which means in the matching graph M(G), the vertices should have a degree of 1 or 0, where the edges should be incident from the graph G.

Maximal matching in a bipartite graph

There are M job applicants and N jobs. Each applicant has a subset of jobs that he/she is interested in. Each job opening can only accept one applicant and a job applicant can be appointed for only one job. Find an assignment of jobs to applicants in such that as many applicants as possible get jobs.



We use Ford-Fulkerson algorithm to find the maximum flow in the flow network

1. Every perfect matching of graph is also a maximum matching of graph

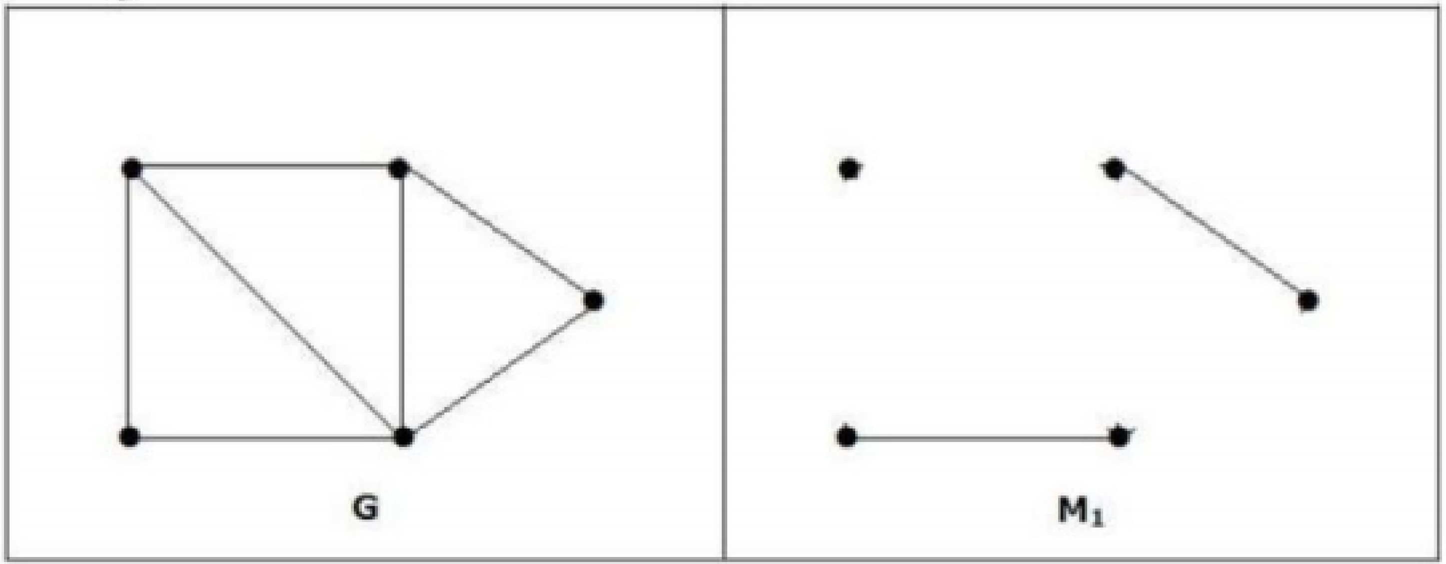
2. A maximum matching of graph need not be perfect.

3. If a graph ‘G’ has a perfect match, then the number of vertices |V(G)| is even.

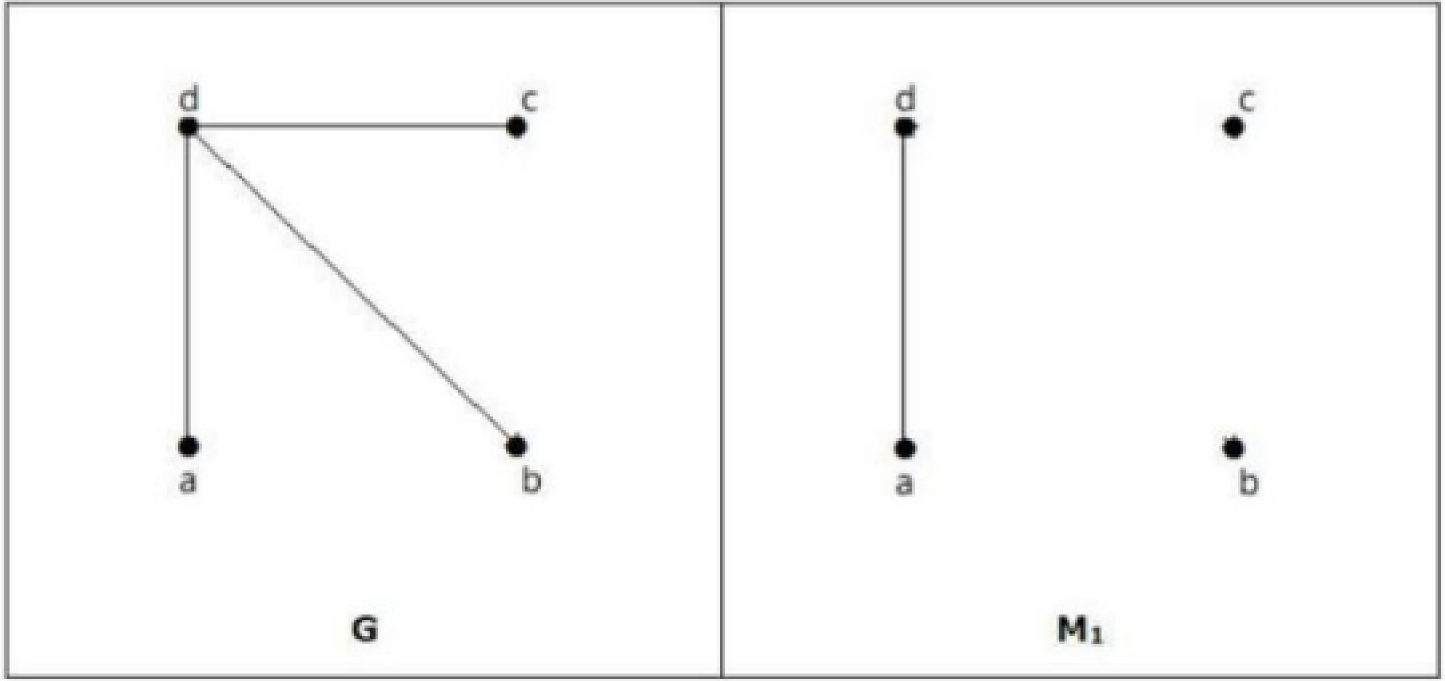
Vice versa not true

4. If G has even number of vertices, then Matching need not be perfect.

A maximum matching of graph need not be perfect.



Not a perfect match, even though it has even number of vertices.



Isomorphic Graph

Planar Graph