

Cliques, Vertex Covers and Independent Sets

Dr. Jayantha Lanel

University of Sri Jayawardanapura

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Outline

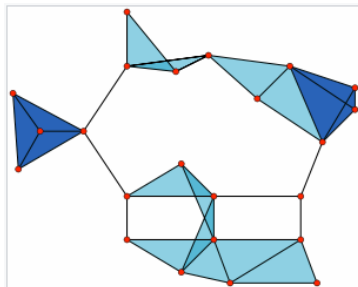
- 1 Cliques
- 2 Vertex Covers
- 3 Independent Sets

Cliques

Every member of a group of people in a social clique knows everybody else.

Clique

a clique is a subset of vertices of an undirected graph such that every two distinct vertices in the clique are adjacent; that is, its induced subgraph is complete.



Maple Commands

Clique Number

The *CliqueNumber*(G) command returns the number of vertices in a largest clique of the graph.

Maximum Clique

The *MaximumClique*(G) command returns a list of vertices which comprise a largest clique.

IsClique

The *IsClique* command returns true if the input graph is a clique (complete graph). It returns false otherwise.

Vertex cover/Independent Set

Vertex Cover

A vertex cover V' of a graph G is a subset of the vertices such that every edge in E is incident on a vertex $v \in V'$. Two vertices not in the cover can not be connected by an edge, or else V' is not a cover. Thus, in the graph complement of G , the vertices not in a clique define a cover.

Independent Set

An Independent set of the graph G is a subset of vertices S such that no two vertices in S represent an edge of G .

Maple Commands

Independence Number

The `IndependenceNumber(G)` command returns the cardinality of a largest independent set of the graph G . This is equal to the Clique Number of the complement of G .

Maximum Independent Set

The `MaximumIndependentSet(G)` command returns a list of vertices comprising a maximum independent set of G .