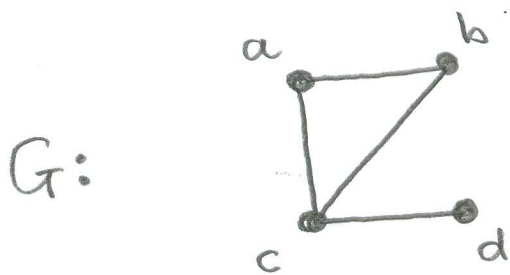


GRAPH THEORY

The definition of a graph: A graph G consists of a non-empty finite set $V(G)$ and a (possibly empty) set $E(G)$ of two-element subsets of $V(G)$. The elements of $V(G)$ are called the vertices and the two-element subsets of $E(G)$ are called the edges of G .

Example 1: Let G be the graph with vertex set $V(G) = \{a, b, c, d\}$ and edge set $E(G) = \{\{a, b\}, \{a, c\}, \{b, c\}, \{c, d\}\}$. A graphic representation of G is then given by



(We often write V and E for the vertex set and the edge set when it is clear what the graph is that we are considering.)

From now on, we are simply writing uv for an edge $\{u, v\}$, so that the edge set of the graph G in example 1 is $E = \{ab, ac, bc, cd\}$.

Definitions of common terms: Two vertices u and v of a graph are adjacent if uv is an edge of the graph. The order of a graph is the number of vertices and the size is the number of edges in the graph.

The graph G in example 1 has order 4 and size 4 — vertex a is adjacent to vertices b and c , but a is not adjacent to d .

The degree of a vertex v in a graph G is the number of vertices adjacent to v and is denoted by $\deg_G(v)$, or $\deg(v)$ if the graph referred to is clear from the context.

