Definition

An undirected graph is a *tree* if it is connected and acyclic. An undirected graph is a *forest* if it is acyclic. Each connected component of a forest is a tree, motivating the definition.

Properties

Proposition 1. *There is a unique path between any two vertices of a tree.*

Proof. Such a path exists because the tree is connected. Such a path is unique because the existence of two separate paths would create a cycle. □

Distance

The *distance* between two vertices v and w in a tree is the length of the unique path connnecting v and w. Recall that the length of a path is the number of edges, or one fewer than the number of vertices. If v and w are adjacent in the tree, then there distance is 1.

Trees

Undirected Paths

Undirected Graphs Lists

Set Numbers Direct Products

Finite Sets

Equivalent Sets

Function Inverses Natural Order Family Unions and Intersections

Function Composites Function Images Families

Functions Equivalence Relations

Relations Peano Axioms

Ordered Pair Projections Natural Induction

Set Products

Set Powers Natural Numbers Generalized Set Dualities

Ordered Pairs Partitions Unordered Triples Successor Sets Intersection of Empty Set Set Dualities Set Unions and Intersections

Set Intersections Pair Unions Set Complements

Set Unions Set Differences Pair Intersections

Unordered Pairs Empty Set

Set Specification

Set Equality

Set Inclusion

Deductions

Quantified Statements

Logical Statements

Statements

Identities Sets

Names

Letters Objects