



# Trees

## 1 Why

Tree branches split and do not recombine. We formalize this property in the language of graphs.

## 2 Definition

A *tree* is a connected acyclic graph.

### 2.1 Notation

We denote trees by  $T$ , a mnemonic for “tree.” Let  $u, v$  be two vertices connected in  $T$ . We denote that the edge between  $u$  and  $v$  exists by writing  $\{u, v\} \in T$ .

## 3 Properties

**Proposition 1.** *There is only one path between any two vertices in a tree.*

*Proof.* Suppose to the contrary that there were two paths from vertex  $u$  to vertex  $v$ , then by combining these paths we obtain a cycle. But the tree has no cycles, so there must not be two paths between any two vertices.  $\square$