

## Every tree with $n$ vertices has exactly $n - 1$ edges

**Theorem:** Every tree with  $n$  vertices has exactly  $n - 1$  edges.

Proof: By induction on  $n$ .

Base case: If  $n = 1$ , then  $T$  has no edges, and the base case holds.

The inductive hypothesis is that  $\exists K \geq 1$  such that for all  $n, 1 \leq n \leq K$ , if tree  $T$  has  $n$  vertices then  $T$  has  $n - 1$  edges.

Now assume  $T$  has  $K + 1 \geq 2$  vertices; we want to prove  $T$  has  $K$  edges.