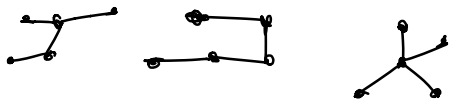
Lem 1: If G has no cycle $\Rightarrow$ $\exists v$ s.t. $\deg(v) \leq 1$.
Therefore if G is a tree $\Rightarrow$ $\exists v$ s.t. $\deg(v) = 1$.

Lem 2: Any tree with n vertices has $n-1$ edges.

Pf:

$P(n)$ = Any tree with n vertices has $n-1$ edges.



Base Case: $P(1)$. • ✓

IH. Assume $P(n-1)$.

IS. Goal: prove $P(n)$.

Choose an arbitrary tree T with n vertices

Lem 1 $\Rightarrow$ T has a vertex v s.t. $\deg(v)=1$

$T' = T - v$ (also remove edge incident to v).

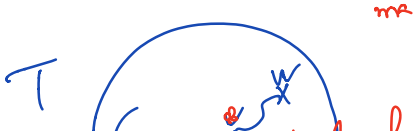
by IH T' has $n-2$ edges $\Rightarrow$ T has $n-1$ edges

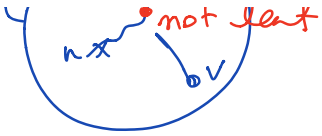
→ Problem: Is T' a tree?

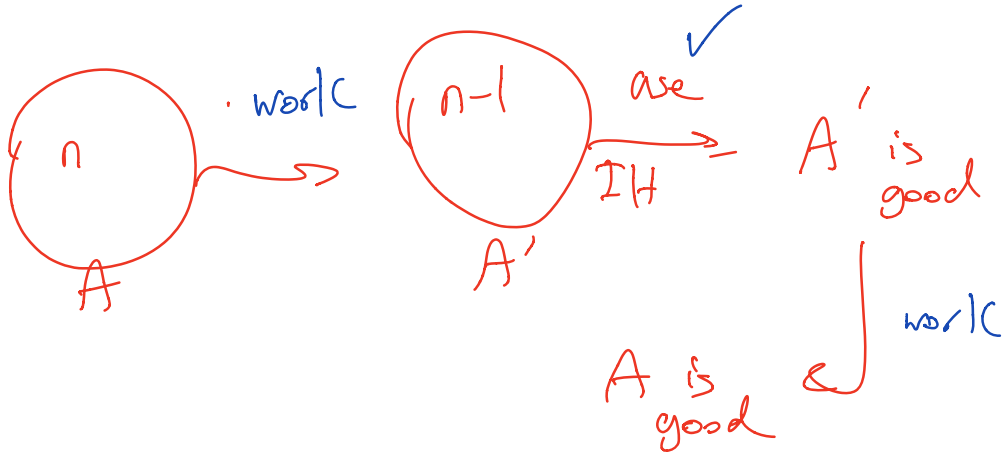
- T' has no cycle: BC T has no cycle & don't make cycles by removing vertices/edges
- T' is connect: BC T was connected and no path between vertices of T can go through a leaf (v).

$\Rightarrow$ [T' is a tree ✓ / T' has $n-1$ vertice ✓] $\Rightarrow$ T' has $n-2$ edges $\Rightarrow$ T has $n-1$ edges

↑ make sure all assumptions of IH are satisfied




not yet
nx
v


n
A
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n-1
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