Lemma: For any $x > 0$, $\log n \leq n^x$ for large enough $n$

(Updated: the proof after lecture)

Proof: $\lim_{n \to \infty} \frac{\log n}{n^x} = \lim_{n \to \infty} \frac{\frac{1}{n}}{n^{x-1}} = \frac{1}{x} \lim_{n \to \infty} \frac{1}{n^x}$

L’Hospital Rule $= 0$

Thus, Every tree with $n$ vertices has exactly $n-1$ edges.

Lemma: If $G$ has no cycle, $\exists \ v \ st \ \deg(v) \leq 1$

Proof by construction:

Start with any vertex $V_1$,

Continue a path start from $V_1$ to $V_2$...

until $\deg(V_i) \leq 1$

Since there is no cycle, every step discovers a new vertex

Since there only $n$ vertex, $\exists$, it terminates in $n$ steps
since there only n vertices, so, it terminates in 1 step.