Proofs by induction that go wrong

What's wrong with this proof of this "theorem"?

Theorem: All finite simple graphs with minimum degree at least 1 are connected

Proof: We prove by induction on n, the number of vertices.

Our Inductive Hypothesis is $P(n)$:

- all simple graphs with n vertices with minimum degree 1 or more are connected.

The base case is $n = 1$ and is vacuously true.

Let $N \geq 1$ be arbitrary, and assume $P(N)$ is true.