Proving $F(n) \geq n$ for all $n \geq 2$ by contradiction

The property $P(n)$ is "$F(n) \geq n$".
We wish to show $P(n)$ is true for $n = 2, 3, \ldots$.

Proof by contradiction.
Suppose this statement is false.

Then there is some $n \geq 2, n \in Z^+$ such that $P(n)$ is false.

Let N be the positive integer s.t. $P(N)$ is false.

We will derive a contradiction to this statement!