[Before we begin the proof, note that assumption (ii) of the claim we're going to prove can be 'translated' as follows: If the statement P is true for a string of positive integers starting with c and ending with m-1, then the statement P(m) is also true.]

Proof: Consider a statement about the natural numbers, P(n), and a fixed positive integer c with the properties (i) and (ii) as given in the exercise.

Just suppose that P(n) is false for some $n \geq c$.

Fix $T = \{ t \mid t$ is a natural number; $t \geq c$ and $P(t)$ is false$\}$. Now, T is not an empty set because it contains n as an element. So, by the Principle of Well-Ordering, T must contain a smallest element; call it m. Note, since m is in T, $m \geq c$ and P(m) is false.

Now P(k) is true for all k with $c \leq k < m$, because m is the smallest element of T. Thus, by (ii), P(m) must be true as well.

Since we have a contradiction, it must be that P(n) is true for all $n \geq c$. This completes the proof.