

Showing $P(n) \rightarrow P(n + 1)$

Recall $A_n = A_{n-1} \cup \{n - 1\}$

The Inductive Hypothesis is the statement

$P(n) = "A_n = \{1, 2, \dots, n - 1\}"$

Let $n \geq 2$ be arbitrary.

Let $n \geq 2$.

By definition, $A_{n+1} = A_n \cup \{n\}$.

Since $n \geq 2$, by the I.H., $A_n = \{1, 2, \dots, n - 1\}$.

Hence, $A_{n+1} = \{1, 2, \dots, n\}$, which is $P(n + 1)$.

Hence we showed $P(n) \rightarrow P(n + 1)$.

Q.E.D.