

The problem Project 6701352.

Let S be given by

Basic: $2 \in S$ and $5 \in S$

Recursive If $x \in S$, then $x+2 \in S$

Show that " $n \in S$ for all $n \geq 4$ "

Proof

Basic Cases.

$$2 \in S \rightarrow 2+2 \in S \rightarrow 4 \in S$$

$$5 \in S$$

Inductive Hypothesis : Assume $4 \in S, 5 \in S, \dots, (k-1) \in S, k \in S$ are true.

Inductive Step : $k+1 = (k-1)+2$

$k-1 \in S$ by IH

$(k-1)+2 \in S$ by Recursive definition

$$\therefore k+1 \in S$$

$\therefore \forall n \in \mathbb{Z}^+ ; n \in S$ for all $n \geq 4$ " is true by Strong Structural Induction