Using strong induction

Let $F : \mathbb{Z}^+ \to \mathbb{Z}$ be defined by

- $F(1) = 1$ and $F(2) = 0$
- $F(n) = F(n-2)$ if $n > 2$

Then $F(n) = n \mod 2$ for all $n \in \mathbb{Z}^+$.

Let $P(k)$ be the assertion:

- $F(k) = k \mod 2$

Now we want to show that for any arbitrary $n \geq 1$,

$$P(1) \wedge P(2) \wedge \ldots \wedge P(n) \rightarrow P(n+1)$$

In other words, we wish to prove that

- IF $\forall k \in \{1, 2, \ldots, n\}, F(k) = k \mod 2$
- THEN $F(n+1) = n+1 \mod 2$