CSE 390Z: Mathematics for Computation Workshop

Week 5 Conceptual Review

Consider the function $f(n)$ defined for integers $n \geq 1$ as follows:
$f(1) = 3$
$f(2) = 5$
$f(n) = 2f(n-1) - f(n-2)$
Prove using strong induction that for all $n \geq 1$, $f(n) = 2n + 1$.
Fill out the induction proof below:

Let P(n) be defined as ____________________. We will prove $P(n)$ is true for all integers $n \geq$ _____ by strong induction.

Base Cases:

So the base cases hold.

Inductive Hypothesis: Suppose for some arbitrary integer $k \geq$_____, P(j) is true for $1 \leq j \leq k$.

Inductive Step:

Goal: Show $P(k+1)$, i.e. show that $f(k+1) = 2(k+1)+1$.

$f(k+1) = 2f((k+1)-1) - f((k+1)-2)$	Definition of f
$= 2f(k) - f(k-1)$	Algebra
$=$	

So P$(k+1)$ holds.

Conclusion: So by strong induction, P(n) is true for all integers $n \geq$_____.