Here are some basic problems for you to try.

1. Consider the sequence of positive integers defined by $a_0 = 0$, $a_1 = 1$, and for every positive integer n, a_{n+1} is the smallest positive integer larger than a_n such that no three distinct terms in the set $\{a_0, a_1, \ldots, a_{n+1}\}$ form an arithmetic progression. What is the value of a_{2009}?

2. How many functions $f : \mathbb{N}_+ \to \mathbb{N}_+$ are there which satisfy the equation $f(f(x)) = 3x$? What happens if we change the domain and codomain to $\mathbb{Q}_+$? What happens if we change the domain and codomain to $\mathbb{R}_+$?

3. A function $f : \mathbb{N}_+ \to \mathbb{N}_+$ is defined by $f(1) = 1$, $f(3) = 3$, and for every positive integer n,

   - $f(2n) = n$;
   - $f(4n+1) = 2f(2n+1) - f(n)$; and
   - $f(4n+3) = 3f(2n+1) - 2f(n)$.

   Determine the number of positive integers less than or equal to 2009 for which $f(n) = n$.