1. Given a set of $n^2 + 1$ positive integers, show that either there exists a subset $A$ of size $n + 1$ such that either (1) no element of $A$ divides another element of $A$, or (2) for every $a, b \in A$ with $a < b$, we have $a$ divides $b$.

2. (a) How many strings of length $n$ consisting of 0’s and 1’s have no two consecutive 1’s?  
(b) How many strings of length $n$ consisting of 0’s and 1’s have no three consecutive 1’s and no three consecutive 0’s?

3. Find $a_n$ if  
   $$a_n = 6a_{n-1} + 7a_{n-2}, a_0 = 2, a_1 = 10.$$