1. Solve the recurrence relations below. Use telescoping if possible, if not, try iteration. If that also won't work, use the characteristic root technique.

   (a) $a_n = 2a_{n-1} + 1$ with $a_0 = 0$ (this was the recursion for the Tower of Hanoi).

   (b) $F_n = F_{n-1} + F_{n-2}$ with $F_0 = 0$ and $F_1 = 1$.

2. **Colorful Tiles**: You have access to 1×1 tiles which come in 2 different colors and 1×2 tiles which come in 3 different colors. We want to figure out how many different 1×10 path designs we can make out of these tiles.

   (a) Find the first few terms of the sequence $a_1, a_2, a_3, \ldots$ where a_n is the number of different $1 \times n$ paths designs. Think about how you can find a_3 from a_2 and a_1.

   (b) Find a recursive definition for the sequence. That is, given a recurrence relation and initial conditions.

   (c) Solve the recurrence relation subject to the initial conditions.

   (d) How many different 1×10 paths can you design?