1. **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 $1 \times n$ path designs we can make out of these tiles.

   Find a recursive definition for the sequence a_n of paths of length n. Then solve the recurrence relation using the characteristic root technique.

2. **Monochromatic Tiles**: Recall, if we have only one type of each tile, we get the Fibonacci sequence: $F_n = F_{n-1} + F_{n-2}$ with $F_0 = 0$ and $F_1 = 1$. Find a close formula for F_n.

3. What goes wrong if you try to solve the recurrence relation $a_n = 6a_{n-1} - 9a_{n-2}$ with initial conditions $a_0 = 1$ and $a_1 = 4$? How can we fix this?