1. **Candy Machine**: Think back to the magical candy machine at King Soopers. Suppose that the first time a quarter is put into the machine 1 Skittle comes out. The second time, 4 Skittles, the third time 16 Skittles, the fourth time 64 Skittles, etc.

   (a) Find both a recursive and closed formula for how many Skittles the nth customer gets.

   (b) Check your solution for the closed formula by solving the recurrence relation using the Characteristic Root technique.

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

   (a) Find a recursive definition for the sequence a_n of paths of length n.

   (b) Solve the recurrence relation using the Characteristic Root technique.