1 Magic Beans

You have traded your cow for 5 magic chocolate covered espresso beans. Each night at midnight, each bean splits into three beans. To take advantage of this, you eat 8 beans each morning for breakfast. You wonder how many beans you will have *after* breakfast 30 days after you traded your cow.

Let $(b_n)_{n\geq 0}$ be the sequence of number of beans you have n days after trading your cow, (after breakfast, before midnight; take $b_0 = 5$).

1. Write out the first few terms of the sequence. Then give a recursive definition for the sequence and explain how you know it is correct.

2. What do you notice about all elements of the sequence? Will they all be ...? Prove your conjecture by mathematical induction.

3. Find a closed formula for b_n and prove it is correct using induction.