Problems on Recurrence Relations (RR) and Cellular Automata (CA)

1. You borrow 2500 dollars, at 12 percentage compounded monthly, to buy a computer. If the loan is to be paid back over two years, what is your monthly payment?

2. Consider the map $x_{n+1} = 2\ x_n \quad (mod\ 1)$ for the starting value $x_0 = 11/24$. Iterate a few times. Convert the sequence you get to base 2 (using for example Wolfram alpha). How can the iterations then be described? Finally find all periodic orbits of length 3 for this map.

3. One can run also asymmetric neigborhoods. Consider two to the left and one to the right. Still we use only two colors. How many rules do we have in this case? Starting with one black cell. Run rule 25289 3 times. Write the rule number in base 2 and try to understand the rule.

4. Consider the two-dimensional outer-totalistic CA rule 16. Describe with words when there is birth and survival. Start with seven black cells in a row. Run it 4 times.