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

1. A particle moves horizontally to the right. For $n \in \mathbf{Z}^+$, the distance the particle travels in the $(n+1)$st second is equal to 3 times the distance it travels during the nth second. If $x_n, n \geq 0$, denotes the position of the particle at the start of the $(n+1)$st second, find a recurrence relation for x_n, where $x_0 = 2$ and $x_1 = 4$. Solve it on the computer. Plot with command Plot the first 10 values of x_n.

2. Plot the unstable 3-periodic orbit in the logistic map with $a = 4$. Use $g(g(g(x)))$ to find it. Illustrate with a figure that is is unstable.

3. Investigate the 1D CA with rule number 184. What is going on? Try some different random seeds (then you use command RandomInteger). It can be seen as a very simple traffic model. Black is a car, white is an empty space. What will the cars do? Illustrate with a figure. **OP**

4. Considering the following rule: Birth if *exactly* one of its neighbors is alive, otherwise it remains unchanged. What is the rule number? Start with one black cell in the middle of a 60 times 60 grid and iterate 28 times and plot it.