Assignment I

Exercise 1 *The logistic map is given by*

$$x_{n+1} = \lambda x_n(1 - x_n)$$

with $x_0 \in [0, 1]$ *and* $\lambda \in [0, 4]$. *Write a* MATLAB*-function which produces a picture of the "attractor" for a sequence of values* $\lambda \in [\lambda_{\min}, \lambda_{\max}]$.

The attractor is (for fixed λ) the collection of limiting values of the sequence x_n for large n. The inputs are $\lambda_{\min}$, $\lambda_{\max}$ and N, the number of values of λ between $\lambda_{\min}$ and $\lambda_{\max}$ for which the attractor is calculated. There is no output, but the function produces a picture with $\lambda \in [\lambda_{\min}, \lambda_{\max}]$ along the horizontal axis and values of x_n for "large" n along the vertical axis.

1. Which value of x_0 do you choose?
2. Which values of n do you use in the picture?
3. Check that the input satisfies $0 \leq \lambda_{\min} \leq \lambda_{\max} \leq 4$.
4. Make sure the figure looks nice.
5. Make the input variable N optional: the function should also work if only $\lambda_{\min}$ and $\lambda_{\max}$ are given as input variables.