Lab 01 - Simulations using random numbers

Consider the following difference equation:

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

▶ **For α in a range of 0.25-4, study the evolution of the normalised variable x. Comment on the distinct features that you observe as you change α.**

▶ **Can the above equation be used as a pseudo random number generator (PRNG)? How would you test the quality of PRNG? Justify your conclusions with suitable test(s).**

▶ **Compare your PRNG with the built-in PRNG/RNG function of MATLAB.**

Exercise: Find out MATLAB's random number generation algorithm(s).

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- Simulate a 1-D random walk using your PRNG. Determine the average position and the standard deviation in the position of the walker as a function of number of walks.

- Repeat the above exercise for 2-D and 3-D random walks.

- Simulate long-term multiple random walks in 2-D and 3-D. Do you observe collisions of the walkers? Is it expected and intuitive?

- Attempt to visualise the above walks.