Computer Science in Ocean and Climate Research
Exercise 7

Tutorial: (Exercise May 26th, 2020) and **Home** (until June 2nd, 2020):

- Perform a spin-up with the spatial-dependent predator-prey model with diffusion with $n = 100$ spatial boxes.

- To obtain spatially varying results, initialize the prey population with

$$x_{0i} = \sin\left(\frac{i\pi}{n}\right), \quad i = 1, \ldots, n,$$

  whereas the initial predator population shall be constant $y_{0i} = 1$ for all $i = 1, \ldots, n$.

- Choose the parameters

$$\alpha = 2.0, \beta = 3.0, \gamma = 1.0, \delta = 3.0, \lambda = 1.0, \mu = 1.0,$$

  and different avlues for $\kappa \in \{0.1, 0.01, 0.001\}$.

- Stop the calculation if the difference of two successive iterates is smaller than $\epsilon = 10^{-4}$ in the Euclidean vector norm.

- Plot the final state (predator and prey) over space.

- Use Euler and improved Euler method for the spin-up. Which method requires less steps?

- Does the number of steps depend on κ and the model parameters?

- You can use an arbitrary programming language for this exercise.