

Lab 6: Analysis of an ODE system

Due date: March 31 , 11:59pm

Write an object-oriented class that can solve an initial-value Ordinary differential equation (ODE) with two parameters. Choose a solving method you understand, we did Euler's method in class and that certainly will lead to good results. The class should have at least two methods,

`__init__` function that specifies the initial values (as an array), the right-hand side of the ODE that is also an array (first array element function 1, second array element function 2); the range of t as an array with start and stop, and finally a timestep dt .

`solve` function that returns the results in a array of coordinates that then can be used to plot, I expect plots for t vs. $x(t)$; t vs $y(t)$ in one plot, pick different colors each curve; and a plot $x(t)$ vs $y(t)$, plot both graphs into one figure using subplot.

Analyze this particular set of ODE:

$$\begin{aligned}\frac{dx}{dt} &= 1.0 - 4.0 * x + yx^2 \\ \frac{dy}{dt} &= 3x - yx^2\end{aligned}$$

Initial values are

$$\begin{aligned}x(0) &= 1.5 \\ y(0) &= 3.0\end{aligned}$$

over the range

$$t = [0, 500]$$

using a

$$dt = 0.01$$