

3. Write a computer program that solves:

$$\begin{cases} \frac{dx}{dt} = -x^2(t) - y(t) \\ \frac{dy}{dt} = 2x(t) - y(t) \end{cases} \quad x(0) = y(0) = 1, \quad t \in [0, 10]$$

Implement in the code numerical Runge-Kutta explicit methods of 2nd and 4th order with the grid step that will provide the maximum relative error less than 10^{-8} :

$$\max_{k=1,10} \left(|x_k(N) - x_k(N/2)| + |y_k(N) - y_k(N/2)| \right) < 10^{-8}$$

Provide the functionality of printing the array of the relative errors onto the console in the format

-- in the first line print the grid number of the final array (e.g. "N = N"),
-- in the second line print the relative error values for the final array in the time moments: $t_1 = 1, t_2 = 2, \dots, t_{10} = 10$, separated by spaces, without the space after the last item.

Provide the functionality of plotting the phase trajectory of the solution on the 2D plane: $\{x(t), y(t)\}$ at $t \in [0, 10]$.