

# COMPUTATIONAL PHYSICS LAB

(PH49012)

SPRING-2021, IIT KGP

Practice Problems (Submission is NOT required)

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**Q1.** Consider the differential equation

$$\frac{dx}{dt} = -x^3 + \sin t$$

with the initial condition  $x = 0$  at  $t = 0$ . Do the time integration and plot your result up to  $t = 10$ , using Euler's method, 2nd and 4th order Runge-Kutta method. Note that smooth solution can be achieved in case of Runge-Kutta method with less number of points.

**Q2.** Consider the following set of equations:

$$\frac{dx}{dt} = xy - x, \quad \frac{dy}{dt} = y - xy + \sin^2 \omega t$$

Solve the given system using 4th order Runge-Kutta method and plot your results from  $t = 0$  to  $t = 10$ , for the case  $\omega = 1$  with initial condition  $x = y = 1$  at  $t = 0$

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*All these problems are discussed in Computational Physics by Mark Newman*