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Subject No. PH39209 (Computational Physics Lab)

Lab Sheet - 1

§1. Find the roots of a quadratic equation

$$a\,x^2 + b\,x + c = 0$$

vary a, b, c such that $b^2 - 4\,a\,c$ satisfy all the conditions, i.e., positive, negative, and zero.

§2. Find the inverse of a 2×2 matrix

$$A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$$

§3. Consider two linear equations, $a\,x + b\,y = c$ and $p\,x + q\,y = r$. Write a simple code to calculate x and y by considering the other quantities as inputs.

§4. Consider the Taylor expansion for $\sin(x) = \sum_{n=0}^{\infty} \frac{(-1)^n}{(2n+1)!} x^{2n+1}$.

Compute $\sin(x)$ considering x as a variable in the range $[0, \pi]$ for $n = 10$. Take the step size $h = \pi/20$ and $h = \pi/3$, and plot $sin(x)$ vs. x for both the values of h in the same graph.