INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI
DEPARTMENT OF MATHEMATICS AND STATISTICS

MA635P-Scientific Programming Laboratory

Lab Exercise-6 (21 Marks) Deadline: 17 February 2026, 4:00 PM

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1. Complete the remaining parts of Exercise-5
2. Reproduce the graphs given in Lecture - 15 (Pages, 3, 4, 6, 7, 8, 10, 12, 14, 16)
3. Check whether the following functions are ill-conditioned or well-conditioned (you can use sympy, scipy and numpy) near the given point x_0
   (a) $f(x) = x^2 - 2, x_0 = 2$
   (b) $f(x) = (x-1)^2, x_0 = 1$
   (c) $f(x) = x^3 - 0.0001x, x_0 = 1$
   (d) $f(x) = (x-2)^3, x_0 = 2$
   (e) $f(x) = (x-2)^3 + 10^{-6}, x_0 = 2$
   (f) $f(x) = \frac{x^2-1}{x-1}, x_0 = 1$
   (g) $f(x) = \sin(100x), x_0 = 0$
   (h) $f(x) = \prod_{k=1}^{20}(x-k)$