NUMERICAL METHODS LABORATORY(MA29202) & NUMERICAL TECHNIQUES LABORATORY(MA39110)

Assignment-2 based on Natural Cubic Splines [1]

1. Use the values given by $f(x) = x^3 + 2$ at points $x = 0, 0.2, 0.4, 0.6, 0.8,$ and 1.0 to find an approximation of $f(x)$ at points $x = 0.1, 0.3,$ and 0.5 using natural cubic spline interpolation. Also find error $|f(x) - S(x)|$ at these points, where $S(x)$ denotes an approximation of $f(x)$ obtained using natural cubic splines.

2. Determine $a, b, c,$ and d so that the following function is a natural cubic spline.

$$f(x) = \begin{cases} -3x^3 & \text{if } 0 \le x \le 2, \\ a(x-2)^3 + b(x-2)^2 + c(x-2) + d & \text{if } 2 \le x \le 3. \end{cases}$$

[1] Sent on: `January 17, 2024`.