

CALCUL NUMERIC

TEMA 10

MACIUCA GLORIA - RUXANDRA

GRUPA 344

Exercitiul 1	1
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Exercitiul 1

Sa se afle functia de interpolare spline patratica S asociata functiei $f(x) = \sin(x)$ relativ la diviziunea $\left(-\frac{\pi}{2}, 0, \frac{\pi}{2}\right)$.

$$S_P(x) = f(x_i) + \left(\frac{2}{h_{i-1}}(f(x_i) - f(x_{i-1})) - b_i\right)(x - x_{i-1}) + \left(\frac{1}{h_i^2}(f(x_{i+1}) - f(x_i) - h_i b_i)\right)(x - x_{i-1})^2$$

$$\begin{array}{lll} x_1 = -\frac{\pi}{2} & x_2 = 0 & x_3 = \frac{\pi}{2} \\ f(x_1) = -1 & f(x_2) = 0 & f(x_3) = 1 \end{array}$$

$$S_P(x) = \begin{cases} S_1(x), & x \in [-\pi/2, 0] \\ S_2(x), & x \in [0, \pi/2] \end{cases}$$

$$h_1 = h_2 = \pi/2$$

$$a_1 = f(x_1) = -1$$

$$a_2 = f(x_2) = 0$$

$$a_3 = f(x_3) = 1$$

$$b_1 = f'(x_1) = 0$$

$$b_2 = 2/h_1(f(x_2) - f(x_1)) - b_1 = 4/\pi(0 + 1) - 0 = 4/\pi$$

$$c_1 = 1/h_1^2(f(x_2) - f(x_1) - h_1 b_1) = 4/\pi^2(0 + 1) = 4/\pi^2$$

$$c_2 = 1/h_2^2(f(x_3) - f(x_2) - h_2 b_2) = 4/\pi^2(1 - 0 - \pi/2 \cdot 4/\pi) = -4/\pi^2$$

$$S_P(x) = \begin{cases} a_1 + b_1(x - x_1) + c_1(x - x_1)^2, & x \in [-\pi/2, 0] \\ a_2 + b_2(x - x_2) + c_2(x - x_2)^2, & x \in [0, \pi/2] \end{cases}$$

$$S_P(x) = \begin{cases} -1 + 4/\pi^2(x + \pi/2)^2, & x \in [-\pi/2, 0] \\ 0 + 4/\pi(x - 0) - 4/\pi^2(x - 0)^2, & x \in [0, \pi/2] \end{cases}$$

$$S_P(x) = \begin{cases} \frac{4}{\pi^2}x^2 + \frac{4}{\pi}x, & x \in [-\pi/2, 0] \\ -\frac{4}{\pi^2}x^2 + \frac{4}{\pi}x, & x \in [0, \pi/2] \end{cases}$$