

Zad. 10 / Zestaw 2 Kinga Kondravuk

$$x_i = x_p + \frac{i}{n} (x_k - x_p)$$

$$h = \frac{x_k - x_p}{n}$$

$$S = f_1 \cdot h + f_2 \cdot h + \dots + f_n \cdot h$$

$$S = h \cdot (f_1 + f_2 + \dots + f_n)$$

$$I = \int_{-1}^2 \sin(x) e^x dx$$

$$x_p = -1 \quad i = 1, 2, \dots, 6$$

$$x_k = 2$$

$$n = 6$$

$$h = \frac{2 - (-1)}{6} = \frac{3}{6} = \frac{1}{2}$$

$$\left. \begin{array}{l}
 x_0 = a = -1 \\
 x_1 = -\frac{1}{2} \\
 x_2 = 0 \\
 x_3 = \frac{1}{2} \\
 x_4 = 1 \\
 x_5 = 1\frac{1}{2} \\
 x_6 = 2
 \end{array} \right| \quad \left. \begin{array}{l}
 x_{0,1} = -0,75 \\
 x_{1,2} = -0,25 \\
 x_{2,3} = 0,25 \\
 x_{3,4} = 0,75 \\
 x_{4,5} = 1,25 \\
 x_{5,6} = 1,75
 \end{array} \right\} \text{środki przedziałów}$$

$$f(x_{0,1}) = \sin(-0,75) \cdot e^{(-0,75)} = -0,322$$

$$f(x_{1,2}) = -0,193$$

$$f(x_{2,3}) = 0,318$$

$$f(x_{3,4}) = 1,443$$

$$f(x_{4,5}) = 3,312$$

$$f(x_{5,6}) = 5,662$$

$$S = 0,5 \cdot (-0,322 + (-0,193) + 0,318 + 1,443 + 3,312 + 5,662)$$

$$= 0,5 \cdot 10,22 = 5,11$$

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Metoda parabol Simpsona

$$a = -1$$

$$b = 2$$

$$I = \int_{-1}^2 \sin(x) e^x dx$$

$$m = 6$$

$$h = \frac{2 - (-1)}{6} = \frac{3}{6} = 0,5$$

$$x_k = a + k \cdot h \quad , \quad k = 0, 1, \dots, m$$

$$x_0 = -1 + 0 \cdot 0,5 = -1$$

$$x_1 = -1 + 1 \cdot 0,5 = -0,5$$

$$x_2 = 0$$

$$x_3 = 0,5$$

$$x_4 = 1$$

$$x_5 = 1,5$$

$$x_6 = 2$$

$$f(x_0) = \sin(-1) e^{-1} = -0,3096$$

$$f(x_1) = -0,2908$$

$$f(x_2) = 0$$

$$f(x_3) = 0,7904$$

$$f(x_4) = 2,286$$

$$f(x_5) = 4,471$$

$$f(x_6) = 6,717$$

$$S = \frac{h}{3} \left[f(x_0) + f(x_6) + 4(f(x_1) + f(x_3) + f(x_5)) + 2(f(x_2) + f(x_4)) \right] =$$

$$\Rightarrow \frac{0,5}{3} \left[-0,3096 + 6,717 + 4(-0,2908 + 0,7904 + 4,471) + 2(0 + 2,286) \right] = 5,144$$