



Problems on spline interpolation

- 1) Construct the natural quadratic spline using the given data for the function $y = f(x)$ and with its help find the approximate values for $f(0,5)$ and $f(1,5)$.

x_i	0	1	2	3	4
y_i	1,2	1,3	1,6	1,2	0,6

Answer: $f(0,5) \approx 1,2125$; $f(1,5) \approx 0,4875$.

- 2) Construct the natural cubic spline using the data for the function $y = f(x)$ and with its help find the approximate values for $f(0,5)$ and $f(1,7)$.

x_i	0,1	1	1,5	2	2,5
y_i	-0,7	0	1	0,8	1,2

Answer: $f(0,5) \approx -0,5993$; $f(1,7) \approx 0,9922$.

- 3) The function $\frac{x^3 - 1}{x^2 + 1}$ is to be approximated in points 1, 1,2, 1,4, 1,6, 1,8, 2 with the help of a natural interpolation spline of: a) first degree; b) second degree; c) third degree. What is the approximation in point 1,5?

Answer: c) $l = (0, -0,2146, -0,2712, -0,2523, -0,2963, 0)$ and $f(1,5) \approx 0,7307$

- 4) Write a computer program for the interpolation of a random function with an interpolation spline of a) second degree; b) of third degree, using a table for the function in a given set of points from its domain of definition.

- 5) The following table with values for the function $y = f(x)$ is given:

x_i	3,0	4,5	7,0	9,0
y_i	2,5	1,0	2,5	0,5

Construct a cubic spline with boundary conditions:

a) $S_3''(3) = \gamma_1 = 0$; $S_3''(9) = \gamma_2 = -0,5$;

b) $S_3''(3) = \gamma_1 = -0,5$; $S_3''(9) = \gamma_2 = -1,5$.

With the help of the splines found calculate the approximate values of the function in points: $z_1 = 4$ and $z_2 = 5$.

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