

SPLINE

1. กำหนดตารางความสัมพันธ์ระหว่างค่า x และ y ได้ดังตาราง

จุดที่	x	y
1 ₀	2	9.5
2 ₁	4	8.0
3 ₂	6	10.5
4 ₃	8	39.5
5 ₄	10	72.5

จงหาค่า $y = f(x)$ เมื่อ $x = 4.5$ ด้วยวิธี

1.1 LINEAR SPLINE พร้อมเขียน code

find slope :

$$\begin{array}{l}
 m_0 = \frac{y_1 - y_0}{x_1 - x_0} \\
 = \frac{8.0 - 9.5}{4 - 2} \\
 = -0.750000
 \end{array}
 \quad
 \begin{array}{l}
 m_1 = \frac{y_2 - y_1}{x_2 - x_1} \\
 = \frac{10.5 - 8.0}{6 - 4} \\
 = 1.250000
 \end{array}
 \quad
 \begin{array}{l}
 m_2 = \frac{y_3 - y_2}{x_3 - x_2} \\
 = \frac{39.5 - 10.5}{8 - 6} \\
 = 14.500000
 \end{array}
 \quad
 \begin{array}{l}
 m_3 = \frac{y_4 - y_3}{x_4 - x_3} \\
 = \frac{72.5 - 39.5}{10 - 8} \\
 = 16.500000
 \end{array}$$

$m = [-0.750000, 1.250000, 14.500000, 16.500000]$

find linear spline :

$$\begin{array}{l}
 f_1(x) = f(x_0) + m_0(x - x_0) \\
 = 9.5 + -0.750000(4.5 - 2) \\
 = 7.625000 \\
 \text{Err} = x_0 \leq x \leq x_1 \\
 = 2 \leq 4.5 \leq 4
 \end{array}
 \quad
 \begin{array}{l}
 f_2(x) = f(x_1) + m_1(x - x_1) \\
 = 8.0 + 1.250000(4.5 - 4) \\
 = 8.625000 \\
 \text{Err} = x_1 \leq x \leq x_2 \\
 = 4 \leq 4.5 \leq 6
 \end{array}$$

result = 8.625000

```

1 const math = require('math.js');
2
3 function linear_spline(x,y,m){
4
5     for(let i=1;i<=m.length;i++){
6         let fx = y[i-1] + (y[i] - y[i-1]) / (x[i] - x[i-1]) * (x - x[i-1]); // y = (y[i] - y[i-1]) / (x[i] - x[i-1]) * (x - x[i-1]) + y[i-1]
7         if(Math.abs(fx - y[i]) < 1e-11){
8             return math.float(fx).toFixed(6);
9         }
10    }
11    return null;
12 }
13
14 let x = [2,4,6,8,10];
15 let y = [9.5,8,10.5,39.5,72.5];
16 let m = [-0.75,1.25,14.5,16.5];
17 console.log(linear_spline(x,y,m));

```

```

[Running] node "c:\Users\WRTEE\Documents\GitHub\numerical-method\linear-spline\linear-spline.js"
8.625000
[Done] exited with code=0 in 2.02 seconds

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