



Lecture 21
on
Numerical Methods & Computer Programming

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Numerical Integration

Trapezoidal rule.

$$\int_{x_0}^{x_n} y \, dx = \frac{h}{2} [y_0 + 2(y_1 + y_2 + \dots + y_{n-1}) + y_n],$$

Derive the trapezoidal rule for numerical integration.

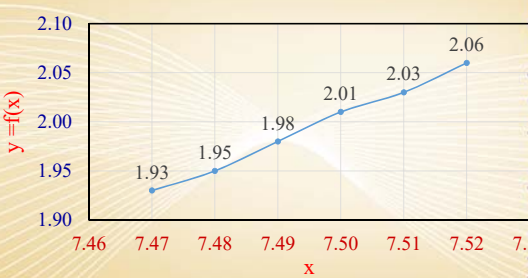
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Numerical Integration

Find the area bounded by the curve and x-axis WHERE start from x = 7.48 to x = 7.52

x	y = f(x)
7.47	1.93
7.48	1.95
7.49	1.98
7.50	2.01
7.51	2.03
7.52	2.06



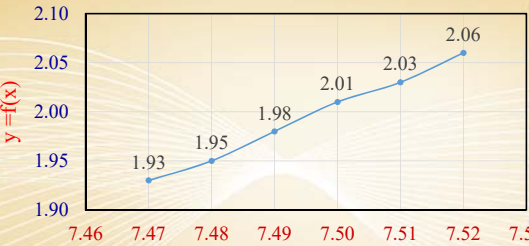
$$\int_{x_0}^{x_n} y \, dx = \frac{h}{2} [y_0 + 2(y_1 + y_2 + \dots + y_{n-1}) + y_n],$$

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Numerical Integration

Find, from the following table, the area bounded by the curve and x-axis from x = 7.47 to x = 7.52

x	y = f(x)
7.47	1.93
7.48	1.95
7.49	1.98
7.50	2.01
7.51	2.03
7.52	2.06



$$\int_{x_0}^{x_n} y \, dx = \frac{h}{2} [y_0 + 2(y_1 + y_2 + \dots + y_{n-1}) + y_n],$$

$$\text{Area} = \frac{0.01}{2} [1.93 + 2(1.95 + 1.98 + 2.01 + 2.03) + 2.06] = 0.0996.$$

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Numerical Integration

1/3 Simpson's rule.

$$\int_{x_0}^{x_n} y \, dx = \frac{h}{3} [y_0 + 4(y_1 + y_3 + y_5 + \dots + y_{n-1}) + 2(y_2 + y_4 + y_6 + \dots + y_{n-2}) + y_n],$$

Even Ordinates
Odd Ordinates

Derive the 1/3 Simpson's rule for numerical integration.

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Thank
you



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