

Lecture 22
 on
Numerical Methods & Computer Programming

Dr Md Abu Sayeed
 Associate Professor
 Civil Engineering Department, RUET

Dr Md Abu Sayeed




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.

Dr Md Abu Sayeed




Numerical Integration

1/3 Simpson's rule.

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

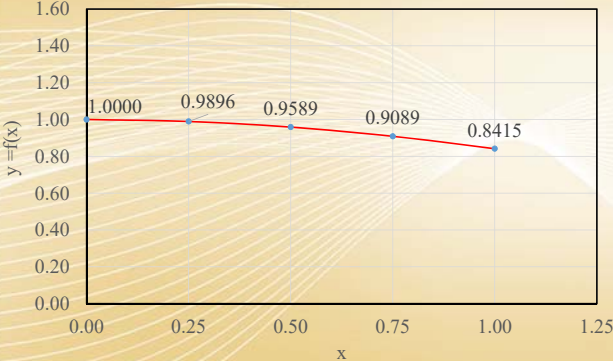
Derive the 1/3 Simpson's rule for numerical integration.

Dr Md Abu Sayeed




Numerical Integration

A solid of revolution is formed by rotation of a curve about x axis. Estimate the volume of the solid formed.



x	y = f(x)
0.00	1.0000
0.25	0.9896
0.50	0.9589
0.75	0.9089
1.00	0.8415

Dr Md Abu Sayeed



Numerical Integration

A solid of revolution is formed by rotation a curve about x axis.
Estimate the volume of the solid formed.??????

From the curve we get the following information

x	y = f(x)
0.00	1.0000
0.25	0.9896
0.50	0.9589
0.75	0.9089
1.00	0.8415

If V is the volume of the solid formed, then we know that

$$V = \pi \int_0^1 y^2 dx$$

Dr Md Abu Sayeed

5

Dr. Md Abu Sayeed, Associate Professor, Dept of CE, RUET

Numerical Integration

A solid of revolution is formed by rotation a curve about x axis.
Estimate the volume of the solid formed.??????

From the curve we get the following information

x	y = f(x)
0.00	1.0000
0.25	0.9896
0.50	0.9589
0.75	0.9089
1.00	0.8415

If V is the volume of the solid formed, then we know that

$$V = \pi \int_0^1 y^2 dx$$

Hence we need the values of y^2 and these are tabulated below.

x	y^2
0.00	1.0000
0.25	0.9793
0.50	0.9195
0.75	0.8261
1.00	0.7081

6

Dr. Md Abu Sayeed, Associate Professor, Dept of CE, RUET

Numerical Integration

A solid of revolution is formed by rotation a curve about x axis.
Estimate the volume of the solid formed.??????

From the curve we get the following information

x	y = f(x)
0.00	1.0000
0.25	0.9896
0.50	0.9589
0.75	0.9089
1.00	0.8415

If V is the volume of the solid formed, then we know that

$$V = \pi \int_0^1 y^2 dx$$

Hence we need the values of y^2 and these are tabulated below.

x	y^2
0.00	1.0000
0.25	0.9793
0.50	0.9195
0.75	0.8261
1.00	0.7081

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

7

Dr. Md Abu Sayeed, Associate Professor, Dept of CE, RUET

Thank
you

Dr Md Abu Sayeed

8