



DEPARTMENT OF MATHEMATICS

Euler's Method :

$$y_{n+1} = y_n + hf(x_n, y_n)$$

Modified Euler's Method :

$$y_{n+1} = y_n + hf\left[x_n + \frac{h}{2}, y_n + \frac{h}{2} f(x_n, y_n)\right]$$

1) Find $y(0.2)$ & $y(0.4)$ by Euler Method.

$$\frac{dy}{dx} = x + y, \quad y(0) = 1$$

Given:

$$f(x, y) = x + y$$

$$x_0 = 0 \quad y_0 = 1$$

$$x_1 = 0.2 \quad y_1 = ?$$

$$x_2 = 0.4 \quad y_2 = ?$$

$$h = x_1 - x_0 = 0.2 - 0 \\ = 0.2$$

By Euler's Method :

Put $n=0$

$$y_1 = y_0 + hf(x_0, y_0)$$

$$= 1 + 0.2 \times 1$$

$$= 1 + 0.2$$

$$y_1 = 1.2$$

$n=1$

$$y_2 = y_1 + hf(x_1, y_1)$$

$$= 1.2 + 0.2 \times 1.4$$

$$y_2 = 1.48$$

$$f(x, y) = x + y$$

$$f(x_1, y_1) = x_1 + y_1,$$

$$= 0.2 + 1.2$$

$$= 1.4$$