



Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

Topic: 5.6 – Problems Euler’s & Modified Euler’s method

10. Using Euler's method find $y(0.2)$ and $y(0.4)$ from $\frac{dy}{dx} = x+y$, $y(0)=1$ with $h=0.2$. [AU M/T 2000, A/M 2010, 2011] [May/June 2012]

Soln:

$$\frac{dy}{dx} = f(x, y) = x+y.$$

Here $x_0=0$, $y_0=1$, $x_1=0.2$, $x_2=0.4$.

By Euler's Algorithm,

$$y_{n+1} = y_n + h f(x_n, y_n), \quad n=0, 1, 2, \dots$$

$$y_1 = y_0 + h f(x_0, y_0).$$

$$= 1 + 0.2 (x_0 + y_0) = 1 + 0.2 (0 + 1) = 1.2.$$

$$\text{i.e. } y(0.2) = 1.2$$

$$y_2 = y_1 + h f(x_1, y_1)$$

$$= 1.2 + 0.2 [x_1 + y_1]$$

$$= 1.2 + 0.2 [0.2 + 1.2]$$

$$= 1.2 + 0.28$$

$$y_2(0.4) = 1.48$$

$$y_3 = y_2 + h f(x_2, y_2)$$

$$= 1.48 + (0.2) [x_2 + y_2]$$

$$= 1.48 + 0.2 [0.4 + 1.48]$$

$$= 1.48 + 0.376$$

$$y(0.6) = 1.856$$



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2. Using Euler's method solve $\frac{dy}{dx} = \frac{y-x}{y+x}$, $y(0) = 1$
for $x = (0) (0.02) (0.1)$
3. Find $y(-0.1)$ and $y(-0.2)$ by using modified Euler's method with $h = -0.1$, given that $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$, $y(0) = 1$
4. Solve $\frac{d^2y}{dx^2} = y^3$, $y(0) = 10$, $y'(0) = 5$ using fourth order R-K method and evaluate $y(0.1)$, $y(0.2)$