

EJERCICIO

Resuelva lo siguiente por el método de Euler mejorado, con 5 intervalos

$$\left(\frac{dy}{dx}\right) = 1 - x + 4y$$

$$y(0) = 1$$

$$y(0.5) = ?$$

$$n=5$$

$$h = \frac{x_f - x_i}{n} = \frac{0.5 - 0}{5} = 0.1$$

1ra Iteracion

$$y_1 = y_0 + h * f(x_0, y_0) = 1 + 0.1(1 - 0 + 4(1)) = 1.5$$

$$\frac{1}{2} ((f(x_0, y_0) + (f(x_1, y_1)))) = \frac{1}{2} ((1 - 0 + 4(1)) + (1 - 0.1 + 4(1.5))) = 5.95$$

$$y_1 = 1 + 0.1(5.95) = 1.595$$

2da Iteracion

$$y_2 = y_1 + h * f(x_1, y_1) = 1.595 + 0.1(1 - 0.1 + 4(1.595)) = 2.323$$

$$\frac{1}{2} ((f(x_1, y_1) + (f(x_2, y_2)))) = \frac{1}{2} ((1 - 0.1 + 4(1.595)) + (1 - 0.2 + 4(2.323))) = 8.686$$

$$y_2 = 1.595 + 0.1(8.686) = 2.4636$$

3era Iteracion

$$y_3 = y_2 + h * f(x_2, y_2) = 2.4636 + 0.1(1 - 0.2 + 4(2.4636)) = 3.52904$$

$$\frac{1}{2} ((f(x_2, y_2) + (f(x_3, y_3)))) = \frac{1}{2} ((1 - 0.2 + 4(2.4636)) + (1 - 0.3 + 4(3.52904))) = 12.73528$$

$$y_3 = 2.4636 + 0.1(12.73528) = 3.737128$$

4ta Iteracion

$$y_4 = y_3 + h * f(x_3, y_3) = 3.737128 + 0.1(1 - 0.3 + 4(3.737128)) = 5.3019$$

$$\frac{1}{2} ((f(x_3, y_3) + (f(x_4, y_4)))) = \frac{1}{2} ((1 - 0.3 + 4(3.737128)) + (1 - 0.4 + 4(5.3019))) = 18.7280$$

$$y_4 = 3.737128 + 0.1(18.7280) = 5.609928$$

5ta Iteracion

$$y_5 = y_4 + h * f(x_4, y_4) = 5.609928 + 0.1(1 - 0.4 + 4(5.609928)) = 7.91388$$

$$\frac{1}{2} ((f(x_4, y_4) + (f(x_5, y_5)))) = \frac{1}{2} ((1 - 0.4 + 4(5.609928)) + (1 - 0.5 + 4(7.91388))) = 27.5976$$

$$y_5 = 5.609928 + 0.1(27.5976) = 8.369681$$