

## Ejercicio

Resuelva el siguiente sistema en 4to orden

$$\text{PVI} \begin{cases} dy/dx=(x-y) \\ y(0) = 2 \\ Y(1)=? \end{cases}$$

$$y_{i+1} = y_i + \frac{h}{6}(k_1 + 2k_2 + 2k_3 + k_4)$$

donde

$$h = \frac{1-0}{5} = 0.2$$

$$k_1 = f(x_i, y_i)$$

$$k_2 = f\left(x_i + \frac{h}{2}, y_i + \frac{hk_1}{2}\right)$$

$$k_3 = f\left(x_i + \frac{h}{2}, y_i + \frac{hk_2}{2}\right)$$

$$k_4 = f(x_i + h, y_i + hk_3)$$

El intervalo de interés es  $[0,1]$  y dividiéndolo en 5 intervalos se tiene  $h = \frac{1-0}{5} = 0.2$

$$k_1 = f(x_i, y_i)$$

$$k_1 = (0-2) = -2$$

$$k_2 = f\left(x_i + \frac{h}{2}, y_i + \frac{hk_1}{2}\right)$$

$$k_2 = \left(\left(0 + \frac{0.2}{2}\right) - \left(2 + \frac{0.2(-2)}{2}\right)\right)$$

$$k_2 = 0.1 - 1.8$$

$$k_2 = -1.7$$

$$k_3 = f\left(x_i + \frac{h}{2}, y_i + \frac{hk_2}{2}\right)$$

$$k_3 = \left(\left(0 + \frac{0.2}{2}\right) - \left(2 + \frac{0.2(-1.7)}{2}\right)\right)$$

$$k_3 = 0.1 - 1.83$$

$$k_3 = -1.73$$

$$k_4 = f(x_i + h, y_i + hk_3)$$

$$k_4 = (0 + 0.2) - (2 + 0.2(1.73))$$

$$k_4 = 0.2 - (2(-0.346))$$

$$k_4 = 0.2 - 1.654$$

$$k_4 = -1.454$$

Ahora se calcula  $y$  en 0.2

$$y(0.2) = 2 + \frac{0.2}{6}(-2 + 2(-1.7) + 2(-1.73) - (1.454))$$

$$y(0.2) = 2 + 0.0333(-2 - 3.4 - 3.46 - 1.454)$$

$$y(0.2) = 2 + 0.0333(-10.314)$$

$$y(0.2) = 2 - 0.3434562$$

$$y(0.2) = 1.6565438$$