

Ejercicio 1

$$\frac{dy}{dx} = 0.2 \cdot x \cdot y$$

$$y_{n+1} = y_n + h \cdot f(x_n, y_n)$$

$$f(x, y) = 0.2 \cdot x \cdot y$$

$$x_0 = 1, y_0 = 1$$

$$h = 0.1, x = 1 \rightarrow x = 1.5$$

$$x_0 = 1, y_0 = 1$$

$$f(x_0, y_0) = 0.2 \cdot 1 \cdot 1 = 0.2$$

$$y_1 = 1 + 0.1 \cdot 0.2 = 1.02$$

$$x_1 = 1.1, y_1 = 1.02$$

$$f = 0.2 \cdot 1.1 \cdot 1.02 = 0.2244$$

$$y_2 = 1.02 + 0.1 \cdot 0.2244 = 1.04244$$

$$x_2 = 1.2, y_2 \approx 1.04244$$

$$f = 0.2 \cdot 1.2 \cdot 1.04244 \approx 0.25019$$

$$y_3 = 1.04244 + 0.1 \cdot 0.25019 = 1.06746$$

$$x_3 = 1.3, y_3 \approx 1.06746$$

$$f = 0.2 \cdot 1.3 \cdot 1.06746 \approx 0.27754$$

$$y_4 = 1.06746 + 0.1 \cdot 0.27754 = 1.09521$$

$$x_4 = 1.4, y_4 \approx 1.09521$$

$$f = 0.2 \cdot 1.4 \cdot 1.09521 \approx 0.30666$$

$$y_5 = 1.09521 + 0.1 \cdot 0.30666 = 1.12587$$

$$y(1.5) \approx 1.1259 \quad h = 0.1$$

Ejerc. no 2

$$\frac{dI}{dt} = 15 - 3I$$

$$I(0) = 0, \quad I(0.5), \quad h = 0.05$$

$$I_{n+1} = I_n + h \cdot f(t_n, I_n), \quad \text{con } f(t, I) = 15 - 3I$$

$$t_0 = 0, \quad I_0 = 0$$

$$f = 15 - 3 \cdot 0 = 15$$

$$I_1 = 0 + 0.05 \cdot 15 = 0.75$$

$$t_1 = 0.05, \quad I_1 = 0.75$$

$$f = 15 - 3 \cdot 0.75 = 12.75$$

$$I_2 = 0.75 + 0.05 \cdot 12.75 = 1.3875$$

$$1.3875 + 0.05 \cdot 10.8875 = 1.929375$$

$$1.929375 + 0.05 \cdot 9.211875 = 2.389969$$

$$2.389969 + 0.05 \cdot 7.830093 = 2.781474$$

$$2.781474 + 0.05 \cdot 6.655578 = 3.114252$$

$$3.114252 + 0.05 \cdot 5.657263 = 3.397115$$

$$3.397115 + 0.05 \cdot 4.808655 = 3.637548$$

$$3.637548 + 0.05 \cdot 4.087357 = 3.841916$$

$$3.841916 + 0.05 \cdot 3.474252 = 4.015629$$

$$I(0.5) \approx 4.0156$$

$$I(t) = 5(1 - e^{-3t})$$

$$I(0.5) = 5(1 - e^{-1.5}) \approx 5(1 - 0.22313) = 5(0.77687) \approx 3.884$$