

① a) Regresi linear $y = ax + b$

$$\begin{bmatrix} n & \sum x \\ \sum x & \sum x^2 \end{bmatrix} \begin{bmatrix} b \\ a \end{bmatrix} = \begin{bmatrix} \sum y \\ \sum xy \end{bmatrix}$$

$$\begin{bmatrix} 13 & 15,6 \\ 15,6 & 26 \end{bmatrix} \begin{bmatrix} b \\ a \end{bmatrix} = \begin{bmatrix} 46 \\ 73,5 \end{bmatrix} \longrightarrow \begin{bmatrix} b \\ a \end{bmatrix} = \frac{1}{99,64} \begin{bmatrix} 26 & -15,6 \\ -15,6 & 13 \end{bmatrix} \begin{bmatrix} 46 \\ 73,5 \end{bmatrix}$$

$$= \begin{bmatrix} 0,521978 \\ 2,513736 \end{bmatrix}$$

$$y = 2,513736x + 0,521978$$

* y pada $x = 0,3$

$$y = 2,513736(0,3) + 0,521978$$

$$= \underline{\underline{1,2760988}}$$

* galat relatif

$$L_y \frac{\text{galat mutlak}}{\text{nilai sejati}} = \frac{|y(0,3) - y_{\text{sebenarnya}}(0,3)|}{y_{\text{sebenarnya}}(0,3)}$$

$$= \frac{|1,2760988 - (e^{0,3} + 0,3 - 0,3^2)|}{e^{0,3} + 0,3 - 0,3^2} = \underline{\underline{0,1819139}}$$

$$b) f'(1,2) = \frac{-3f(1,2) + 4f(1,4) - f(1,6)}{2 \cdot h}$$

$$= \frac{-9,3 + 14 - 4}{0,4} = \underline{\underline{1,75}}$$

$$f''(1,2) = \frac{-f(1,8) + 4f(1,6) - 5f(1,4) + 2f(1,2)}{h^2}$$

$$= \frac{-4,6 + 16 - 17,5 + 6,2}{0,04} = \underline{\underline{2,5}}$$

* galat relatif $f'(1,2)$

$$L_y \left| \frac{f'(1,2) - f'_{\text{aktual}}(1,2)}{f'_{\text{aktual}}(1,2)} \right| = \left| \frac{1,75 - (e^{1,2} - 2(1,2) + 1)}{e^{1,2} - 2(1,2) + 1} \right| = \underline{\underline{0,088597169}}$$

* galat relatif $f''(1,2)$

$$L_y \left| \frac{2,5 - (e^{1,2} - 2)}{e^{1,2} - 2} \right| = \underline{\underline{0,89377}}$$

$$c.) \int_0^{2,9} f(x) dx$$

$$= \frac{h}{3} \left[f(0) + 4f(0,2) + 2f(0,4) + 4f(0,6) + 2f(0,8) + 4f(1) + 2f(1,2) + 4f(1,4) + 2f(1,6) + 4f(1,8) + 2f(2) + 4f(2,2) + f(2,4) \right]$$

$$= \frac{0,2}{3} [1 + 5,6 + 3,4 + 8,4 + 4,8 + 10,8 + 6,2 + 14 + 8 + 18,4 + 10,8 + 25,6 + 7,7]$$

$$= \underline{8,31333}$$

* Galat relatif

$$L) \left| \frac{8,3133 - \left[e^x + \frac{x^2}{2} - \frac{x^3}{3} \right]_0^{2,9}}{\left[e^x + \frac{x^2}{2} - \frac{x^3}{3} \right]_0^{2,9}} \right| = \left| \frac{8,3133 - 8,29517}{8,29517} \right| = \underline{0,002189225778}$$

$$(2) a.) \frac{dy}{dx} = x^2 - 3x + 1 + y$$

$$a = x_0 = 0 \quad b = x_n = 0,3 \quad y_0 = 1$$

$$N = \frac{0,3 - 0}{0,15} = 2 \text{ (Banyak iterasi)}$$

Iterasi 1

$$x_1 = 0,15$$

$$k_1 = h f(x_0, y_0) = (0,15) (-2) = 0,3$$

$$k_2 = h f(x_0 + \frac{1}{2}h, y_0 + \frac{1}{2}k_1) = (0,15) ((0,075)^2 - 3(0,075) + 1 + 1,15) = 0,28959375$$

$$k_3 = h f(x_0 + h, y_0 + k_1 + k_2) = (0,15) ((0,15)^2 - 3(0,15) + 1 + 1,2791875) = (1,8516875)(0,15)$$

$$y_1 = y_0 + \frac{1}{6}(k_1 + 4k_2 + k_3) = 0,2777531$$

$$= 1 + \frac{1}{6}(0,3 + 4(0,28959375) + 0,2777531)$$

$$= \underline{1,2894}$$

Iterasi 2

$$x_2 = 0,3$$

$$k_1 = h f(x_1, y_1) = (0,15) ((0,15)^2 - 3(0,15) + 1 + 1,284) = (1,8574)(0,15) = 0,2786$$

$$k_2 = h f(x_1 + \frac{1}{2}h, y_1 + \frac{1}{2}k_1) = (0,15) ((0,225)^2 - 3(0,225) + 1 + 1,4287) = 0,2706$$

$$k_3 = h f(x_1 + h, y_1 + k_1 + k_2) = (0,15) ((0,3)^2 - 3(0,3) + 1 + 1,552) = 0,2613$$

$$y_2 = y_1 + \frac{1}{6}(k_1 + 4k_2 + k_3)$$

$$= 1,2894 + \frac{1}{6}(0,2786 + 4(0,2706) + 0,2613) = \underline{1,559783}$$

b.) * Galat relatif

$$\left| \frac{1,559783 - 1,559859}{1,559859} \right| = \underline{0,0004872}$$