ATIVIDADE 03

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1)

	0	1	11
X (Km)	1	7	14
Y (Reais)	10,5	17,7	35,2

* Resolvendo através de Interpolação Linear:

- $\frac{Y_1 - Y_0}{X_1 - X_0} = \frac{Y - Y_0}{X - X_0} \rightarrow \frac{35,2 - 17,7}{14 - 7} = \frac{Y - 17,7}{9 - 7}$

$\rightarrow \frac{17,5}{7} = \frac{Y - 17,7}{2} \rightarrow 7Y - 123,9 = 35$

$Y = \frac{158,9}{7} \rightarrow \therefore Y = 22,7$ Reais

* Resolvendo através de Lagrange:

$f(9) = Y_1 \cdot L_1^2 + Y_2 \cdot L_2^2 + Y_3 \cdot L_3^2$

- $L_1(x) = \frac{(x - X_2) \cdot (x - X_3)}{(X_1 - X_2) \cdot (X_1 - X_3)} \rightarrow L_1(9) = \frac{(9-7) \cdot (9-14)}{(1-7) \cdot (1-14)} = \frac{2 \cdot (-5)}{(-6) \cdot (-13)} = \frac{-10}{78}$

$\therefore L_1(9) = \frac{-10}{78}$

- $L_2(9) = \frac{(9-1) \cdot (9-14)}{(7-1) \cdot (7-14)} = \frac{8 \cdot (-5)}{6 \cdot (-7)} = \frac{-40}{42} \rightarrow \therefore L_2(9) = \frac{40}{42}$

- $L_3(9) = \frac{(9-1) \cdot (9-7)}{(14-1) \cdot (14-7)} = \frac{8 \cdot 2}{13 \cdot 7} = \frac{16}{91} \rightarrow \therefore L_3(9) = \frac{16}{91}$

$$f(9) = 10,5 \cdot \left(\frac{-10}{78}\right) + 17,7 \cdot \left(\frac{40}{42}\right) + 35,2 \cdot \left(\frac{16}{91}\right)$$

$$\therefore f(9) = 21,7 \text{ Reais}$$

Portanto,

- Por Interpolação Linear: $Y = 22,7$ Reais.
- Por Lagrange: $f(9) = 21,7$ Reais.

2) $\int_2^3 x \cdot e^{x/2}$ →

x	2	2,25	2,50	2,75	3
f(x)	5,43	6,93	8,72	10,87	13,44

$h = 0,25$

~~3,25~~
~~16,30~~

* Resolvendo através da Regra do trapézio:

$$\int_2^3 x \cdot e^{x/2} = \frac{h}{2} \cdot [f(x_0) + 2 \cdot [f(x_1) + f(x_2) + f(x_3) + f(x_4)]]$$

$$= \frac{0,25}{2} [5,43 + 2 \cdot [6,93 + 8,72 + 10,87 + 13,44]]$$

$$\therefore \int_2^3 x \cdot e^{x/2} = 10,66$$

* Resolvendo através do método de Simpson:

$$\int_2^3 x \cdot e^{x/2} = \frac{h}{3} \cdot [f(x_0) + 4 \cdot f(x_1) + f(x_2)] + \frac{h}{3} \cdot [f(x_2) + 4 \cdot f(x_3) + f(x_4)]$$

$$= \frac{h}{3} \cdot [5,43 + 4 \cdot 6,93 + 8,72] + \frac{h}{3} \cdot [8,72 + 4 \cdot 10,87 + 13,44]$$

$$= \frac{0,25}{3} \cdot 41,87 + \frac{0,25}{3} \cdot 65,64$$

$$\therefore \int_2^3 x \cdot e^{x/2} = 8,95$$

* Portanto,

- Pela Regra do trapézio: $\int_2^3 x \cdot e^{x/2} = 10,66$
- Pelo Método de Simpson: $\int_2^3 x \cdot e^{x/2} = 8,95$