x_i	0	0 5	0 75	1
$\operatorname{sen} x_i$	0	0 479	0 682	0 841

x	f_0	f_1	f_2	f_3
0	$\boxed{0}$			
		$\boxed{0\ 958}$		
			$\boxed{-0\ 195}$	
0 5	0.479			
		0 812		$\boxed{-0.157}$
			-0 352	
0 75	0 682			
		0.636		
1	0 841			

$$f[x_0,x_1] = \frac{f[x_1]-f[x_0]}{x_1-x_0} = \frac{0.479-0}{0.5-0} = 0.958$$

$$f[x_1,x_2] = \frac{f[x_2]-f[x_1]}{x_2-x_1} = \frac{0.682-0.479}{0.75-0.5} = 0.812$$

$$f[x_2,x_3] = \frac{f[x_3]-f[x_2]}{x_3-x_2} = \frac{0.841-0.682}{1-0.75} = 0.636$$

$$f[x_0,x_1,x_2] = \frac{f[x_1,x_2]-f[x_0,x_1]}{x_2-x_0}$$

$$= \frac{0.812-0.958}{0.75-0} = -0.195$$

$$f[x_1,x_2,x_3] = \frac{f[x_2,x_3]-f[x_1,x_2]}{x_3-x_1}$$

$$= \frac{0.636-0.812}{1-0.5} = -0.352$$

$$f[x_0, x_1, x_2, x_3] = \frac{f[x_1, x_2, x_3] - f[x_0, x_1, x_2]}{x_3 - x_0}$$

$$= \frac{-0.352 - (-0.195)}{1 - 0} = -0.157$$

$$P_3(x) = 0 + 0.958x - 0.195x(x - 0.5) - 0.157x(x - 0.5)(x - 0.75)$$

$$P_3(0.65) = 0.958 \cdot 0.65 - 0.195 \cdot 0.65 \cdot 0.15 - 0.157 \cdot 0.65 \cdot 0.15 \cdot (-0.1)$$

$$= 0.605$$

ESTIMATIVA DO ERRO PELA FÓRMULA DO ERRO

$$M_4 = \max_{x \in [0,1]} |f^{(4)}(x)|$$

$$|f(x) - P_3(x)| \leq \frac{M_4}{4!} |x(x-0.5)(x-0.75)(x-1)|$$

PARA $x = 0.65$,

$$|ERRO| \leq \frac{M_4}{24} 0.65 * 0.15 * 0.1 * 0.35$$

$$f(x) = SEN(x) \Rightarrow f^{(4)}(x) = SEN(x)$$

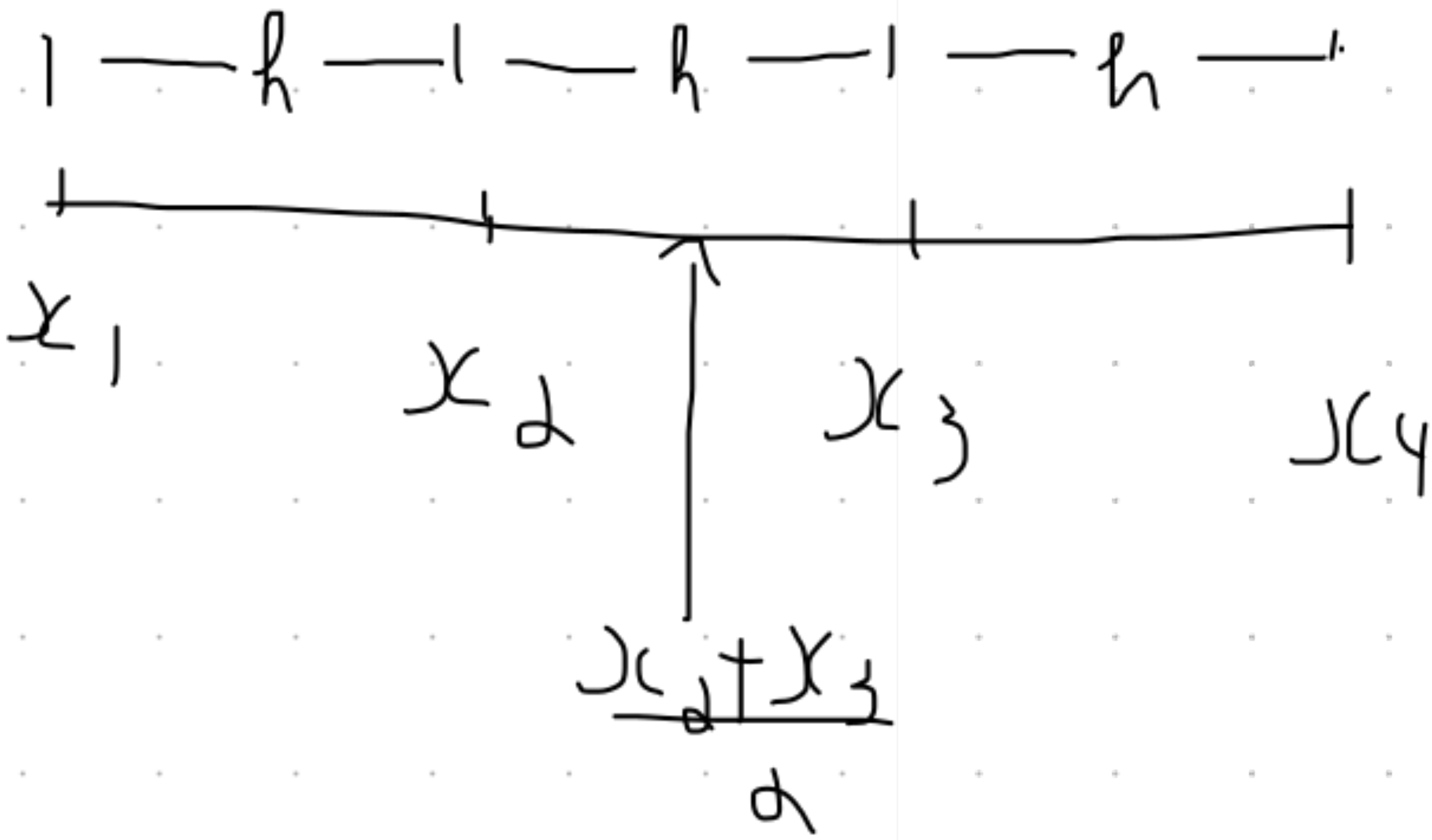
$$\Rightarrow M_4 \leq 1$$

$$\Rightarrow |ERRO| \leq 0.0001422 //$$

<u>OBS</u> $P_3(0.65) = 0.605$ $SEN(0.65) \simeq 0.60519$

ERRO "EXATO" $\simeq 0.00019$ (?)

EXERCÍCIO 9



DETERMINE a_1, a_2, a_3 E a_4 TAL QUE, PARA TODO POLINÔMIO DE GRAU ≤ 3,

$$P\left(\frac{x_2+x_3}{2}\right) = a_1 P(x_1) + a_2 P(x_2) + a_3 P(x_3) + a_4 P(x_4)$$

DA UNICIDADE DO POL INTERP, PODEMOS AFIRMAR QUE, SE P FOR UM POLINÔMIO DE GRAU ≤ 3, ENTÃO

$$\boxed{P(x) = P(x_1)L_1(x) + P(x_2)L_2(x) + P(x_3)L_3(x) + P(x_4)L_4(x) \quad \text{(LAGRANGE)}}$$

$$L_1(x) = \frac{(x-x_2)(x-x_3)(x-x_4)}{(x_1-x_2)(x_1-x_3)(x_1-x_4)}$$

$$L_2(x) = \frac{(x-x_1)(x-x_3)(x-x_4)}{(x_2-x_1)(x_2-x_3)(x_2-x_4)}$$

$$L_3(x) = \frac{(x-x_1)(x-x_2)(x-x_4)}{(x_3-x_1)(x_3-x_2)(x_3-x_4)}$$

$$L_4(x) = \frac{(x-x_1)(x-x_2)(x-x_3)}{(x_4-x_1)(x_4-x_2)(x_4-x_3)}$$

$$\Longrightarrow$$

$$a_j = L_j\left(\frac{x_2+x_3}{2}\right), \quad j = 1,2,3 \text{ E } 4$$