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- Newton - Gregory

$$* f(x) = \frac{x}{x+1}$$

$x_i$	0	1	2
$f(x_i)$	0	$1/2$	$2/3$

- Polinômio interpolador ( $k=1$ )

$x$	$\Delta^0 f(x)$	$\Delta^1 f(x)$	$\Delta^2 f(x)$
0	0		
1	$1/2$	$1/2$	
			$-1/3$



Polinômio interpolador ( $h=1$ )

$x$	$\Delta^0 f(x)$	$\Delta^1 f(x)$	$\Delta^2 f(x)$
0	0		
1	1/2	1/2	
2	2/3	1/6	-1/3

$$\Rightarrow P_3(x) = f(x_0) + (x-x_0) \frac{\Delta f(x_0)}{h} + (x-x_0)(x-x_1) \frac{\Delta^2 f(x_0)}{h^2 \cdot 2}$$

$$P_3(x) = 0 + (x-0) \left( \frac{1}{2} \right) + (x-0)(x-1) \left( \frac{-1}{3} \right)$$

$$\therefore P_3(x) = \frac{-x^2 + 4x}{6}$$



- $F(1,3)$

$$F(1,3) \approx P_3(1,3) = 0,585$$

- Error

\* Error exacto  $-(x-x_0)(x-x_1)M_4$

$$|E_1(1,3)| = |P_2(1,3) - P_3(1,3)| = |0,5652 - 0,585|$$

$$\Rightarrow E_1(1,3) = 0,0198$$

\* Limitante superior

$$\rightarrow F''(x) = -2$$



# Limitante superior

$$\rightarrow F''(x) = -\frac{2}{(x+1)^3}$$

$$|E_2(1,3)| \leq |(x-x_1)(x-x_2)| \frac{M_2}{2!}$$

$$\hookrightarrow M_2 = \max\{|-1/4|; |-2/27|\}$$

$$\Rightarrow |E_2(1,3)| \leq |(1,3-1)(1,3-2)| \left(\frac{1}{4}\right) \left(\frac{1}{2}\right)$$

$$\Rightarrow |E_2(1,3)| \leq 0,02625$$

$$\therefore E_1(1,3) = 0,0198 \quad \text{ou} \quad |E_2(1,3)| \leq 0,02625$$