(1) Polinômio de Taylor de $\ln x$ em torno c

	$x_0 = 1$
$f(x) = \ln x$	$\ln(1) = 0$
$f'(x) = 1/x$	$1/1 = 1$
$f''(x) = -1/x^2$	$\frac{-1}{1^2} = -1$
$f^{(3)}(x) = \frac{+2}{x^3}$	$\frac{+2}{1^3} = +2$
$f^{(4)}(x) = \frac{-2 \times 3}{x^4}$	$\frac{-2 \times 3}{1^4} = -2 \times 3$
$f^{(5)}(x) = \frac{2 \times 3 \times 4}{x^5}$	$\frac{2 \times 3 \times 4}{1^5} =$
	$2 \times 3 \times 4$

Em geral

$$f^{(n)}(x) = (-1)^{n+1} 2 \times 3 \times 4 \times \ldots \times n$$

positivo no impar

negativo no par

Daí, $f^{(2n)}(1) = -1 \times 2 \times 3 \times \ldots \times 2n$

$f^{(2n+1)}(1) = 2 \times 3 \times \ldots \times (2n+1)$

2) $f(1)=0$

$f'(1)=1=0!$

$f''(1)=(-1)\,1=(-1)1!$

$f'''(1)=2=2!$

$f^{(IV)}(1)=(-1)\,2\times3=3!$

$f^{(V)}(1)=2\times3\times4=4!$

~~$f^{(VI)}(1)=(-1)2\times3\times4\times5=5!$~~

$f^{(VI)}(1)=(-1)2\times3\times4\times5=5!$

$$f^{(n)}(1)=\begin{cases}0 & n=0\\ (-1)^{2n-1}(n-1)!\end{cases}$$

Polinômio de Taylor de grau 6

$$f(x)\approx f(x_0)+f'(x_0)(x-x_0)+\frac{f''(x_0)(x-x_0)^2}{2!}+\dots+\frac{f^{(VI)}(x_0)(x-x_0)^6}{6!}$$

No nosso caso $x_0=1$, $f(x)=\ln(x)$

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(3) Vamos calcular $\ln \frac{1}{2}$ • Orden 6

$$\ln \frac{1}{2} \cong 0 + \frac{0!(\frac{1}{2}-1)}{1!} + \frac{(-1)\,1!\,(\frac{1}{2}-1)^2}{2!} + \frac{2!\,(\frac{1}{2}-1)^3}{3!} +$$

$$\frac{(-1)(3!)(\frac{1}{2}-1)^4}{4!} + \frac{(4!)(\frac{1}{2}-1)^5}{5!} + (-1)\frac{5!}{6!}(\frac{1}{2}-1)^6$$

$$\ln \frac{1}{2} \cong -\frac{1}{2} - \frac{1}{2}\left(\frac{1}{2}\right)^2 + \frac{(-\frac{1}{2})^3}{3} + \left(-\frac{1}{4}\right)\left(\frac{1}{2}\right)^4 +$$

$$\frac{1}{5}\left(-\frac{1}{2}\right)^5 + \left(-\frac{1}{6}\right)\left(\frac{1}{2}\right)^6$$

$$= -\left[\frac{1}{2} + \frac{1}{2}\,\frac{1}{2^2} + \frac{1}{3}\,\frac{1}{2^3} + \frac{1}{4}\,\frac{1}{2^4} + \right.$$

$$\left.\frac{1}{5}\,\frac{1}{2^5} + \frac{1}{6}\,\frac{1}{2^6}\right]$$

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(4) $\ln \frac{1}{2} \cong -\left[\frac{1}{2} + \frac{1}{2}\cdot\frac{1}{4} + \frac{1}{3}\cdot\frac{1}{8} + \frac{1}{4}\cdot\frac{1}{16} + \frac{1}{5}\cdot\frac{1}{32} + \frac{1}{6}\cdot\frac{1}{64}\right] = -0{,}6911458$

$$\text{Erro} = \frac{f^{(n+1)}(\bar{x})(x-x_0)^7}{7!} = \frac{6!\,(\frac{1}{2}-1)^7}{\bar{x}^7\, 7!}$$

Erro em módulo

$$\frac{1}{7}\,\frac{1}{\bar{x}^7}\cdot\frac{1}{2^7}$$

No melhor caso $\frac{1}{7 * 2^7}$

No pior caso $\frac{1}{7}\cdot\frac{1}{(\frac{1}{2})^7}\cdot\frac{1}{2^7} = \frac{1}{7} = 0{,}1428$

Na calculadora $\ln \frac{1}{2} = 0{,}6931472$

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