

> restart

obtener el desarrollo en Serie Trigonométrica de Fourier en términos de $(-1)^n$

> $f := \exp(-a \cdot x)$

$$f := e^{-ax}$$

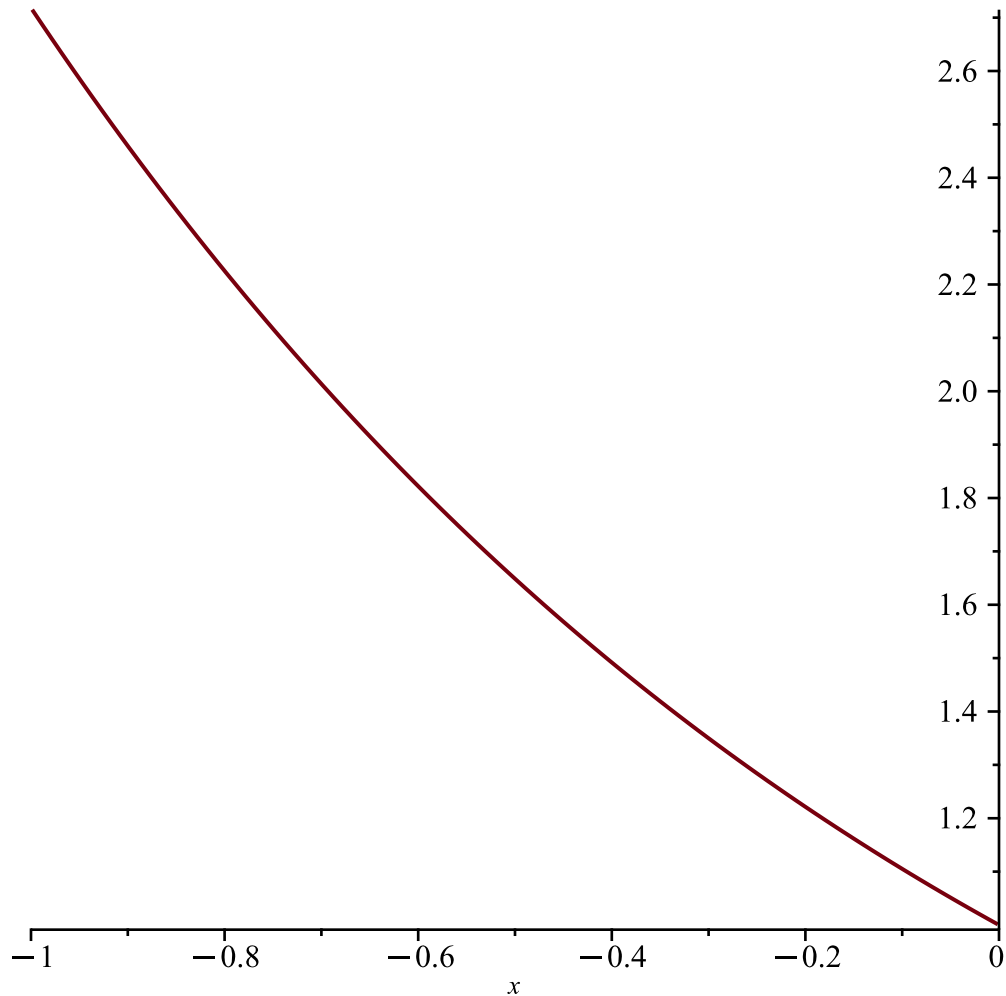
(1)

> $\text{intervalo} := -a < x < 0$

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(2)

> $\text{plot}(\text{subs}(a=1, f), x=-1..0)$

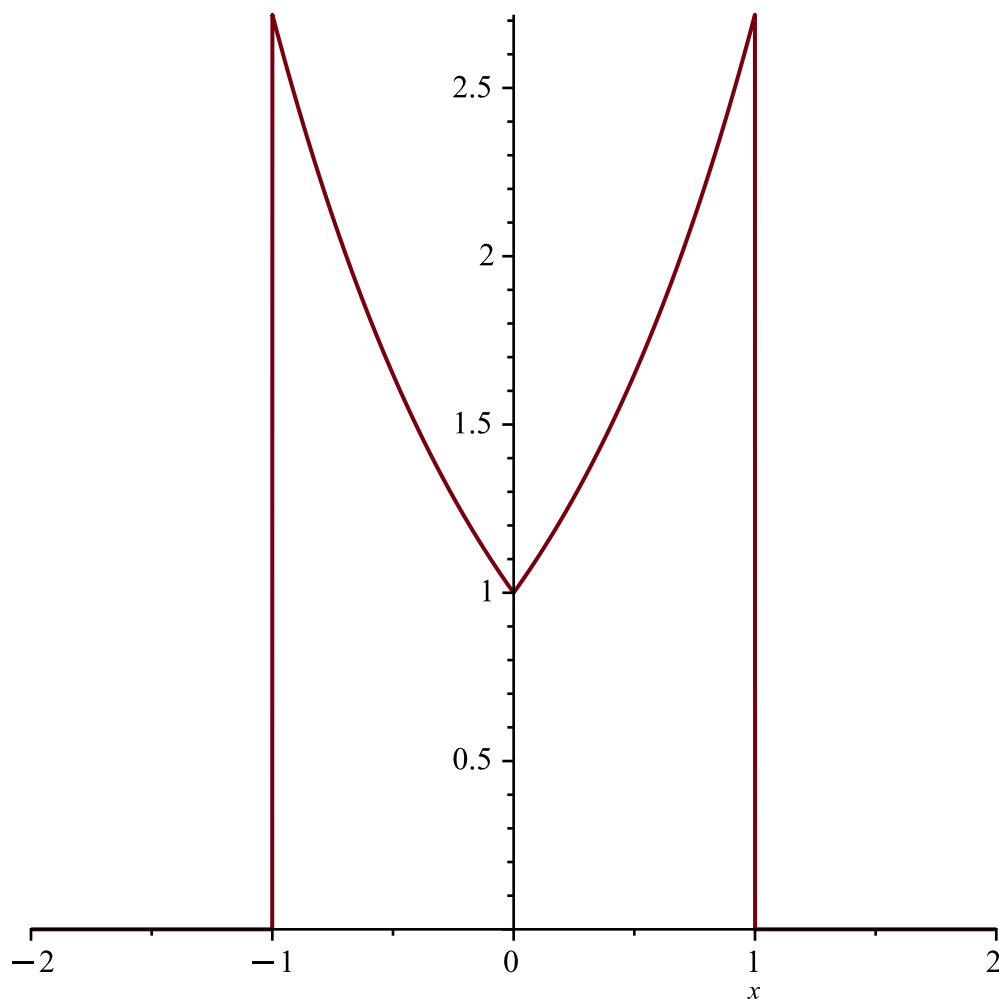


> $g := \text{Heaviside}(x+a) \cdot \exp(-a \cdot x) - \text{Heaviside}(x) \cdot \exp(-a \cdot x) + \text{Heaviside}(x) \cdot \exp(a \cdot x) - \text{Heaviside}(x-a) \cdot \exp(a \cdot x)$

$$g := \text{Heaviside}(x+a) e^{-ax} - \text{Heaviside}(x) e^{-ax} + \text{Heaviside}(x) e^{ax} - \text{Heaviside}(x-a) e^{ax}$$

(3)

> $\text{plot}(\text{subs}(a=1, g), x=-2..2)$



$$\begin{aligned} &> g \\ &\quad \text{Heaviside}(x + a) e^{-ax} - \text{Heaviside}(x) e^{-ax} + \text{Heaviside}(x) e^{ax} - \text{Heaviside}(x - a) e^{ax} \end{aligned} \quad (4)$$

$$\begin{aligned} &> L := a \\ &\quad L := a \end{aligned} \quad (5)$$

$$\begin{aligned} &> a[0] := \text{expand}\left(\frac{1}{L} \cdot \text{int}(g, x = -L..L)\right) \\ a_0 &:= \frac{2 \text{Heaviside}(a) e^{a^2}}{a^2} - \frac{2 \text{Heaviside}(a)}{a^2} - \frac{2 \text{Heaviside}(-a) e^{a^2}}{a^2} + \frac{2 \text{Heaviside}(-a)}{a^2} \end{aligned} \quad (6)$$

$$\begin{aligned} &> a[n] := \text{expand}\left(\text{subs}\left(\sin(n \cdot \text{Pi}) = 0, \cos(n \cdot \text{Pi}) = (-1)^n, \frac{1}{L} \cdot \text{int}\left(g \cdot \cos\left(\frac{n \cdot \text{Pi}}{L} \cdot x\right), x = -L \right.\right.\right. \\ &\quad \left.\left.\left.\left.\left.\left.\right.\right.\right)\right.\right) \\ a_n &:= \frac{2 a^2 \text{Heaviside}(a) e^{a^2} (-1)^n}{\pi^2 n^2 + a^4} - \frac{2 a^2 \text{Heaviside}(a)}{\pi^2 n^2 + a^4} - \frac{2 a^2 \text{Heaviside}(-a) e^{a^2} (-1)^n}{\pi^2 n^2 + a^4} \\ &\quad + \frac{2 a^2 \text{Heaviside}(-a)}{\pi^2 n^2 + a^4} \end{aligned} \quad (7)$$

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> b[n] := expand(subs(sin(n·Pi) = 0, cos(n·Pi) = (-1)^n, 1/L · int(g·sin(n·Pi/L · x), x = -L ..L)))
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$$b_n := 0$$

(8)

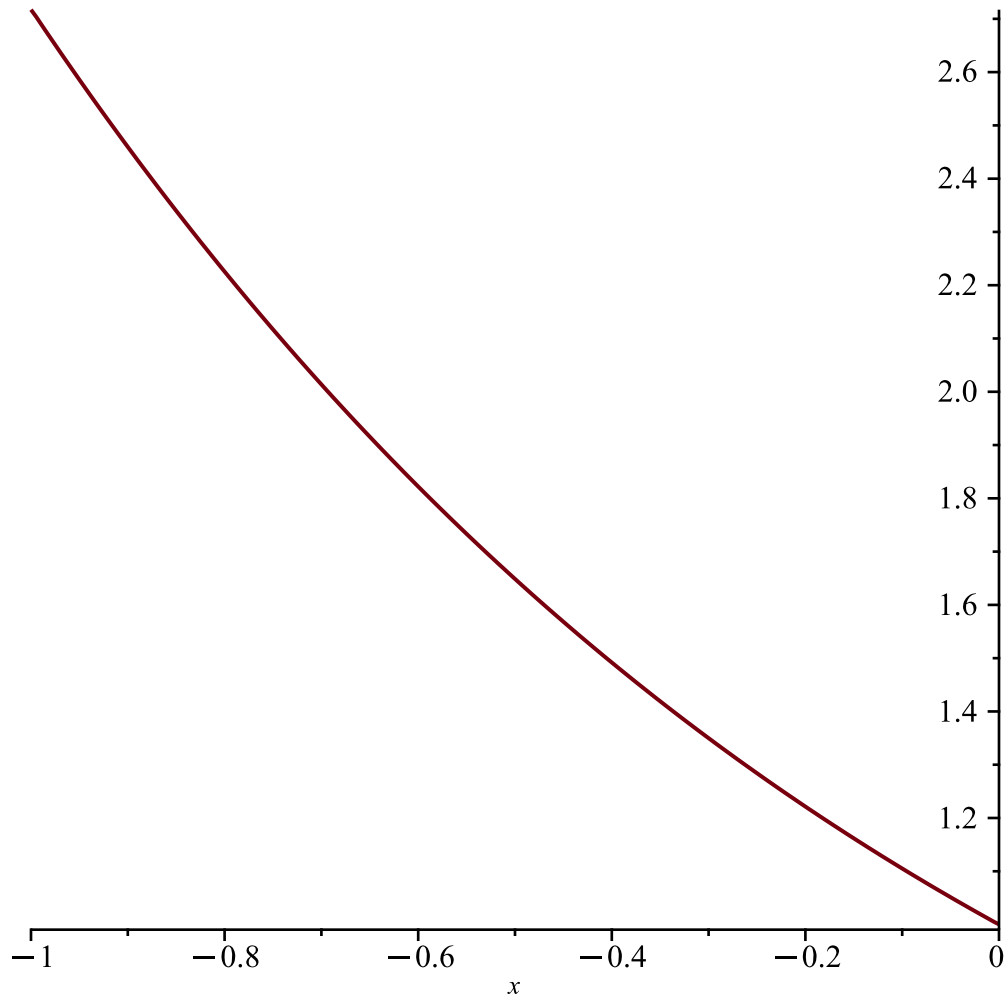
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> STF := a[0]/2 + Sum(a[n]·cos(n·Pi/L · x), n = 1 ..infinity)
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$$STF := \frac{\text{Heaviside}(a) e^{a^2}}{a^2} - \frac{\text{Heaviside}(a)}{a^2} - \frac{\text{Heaviside}(-a) e^{a^2}}{a^2} + \frac{\text{Heaviside}(-a)}{a^2} + \left(\sum_{n=1}^{\infty} \left(\frac{2 a^2 \text{Heaviside}(a) e^{a^2} (-1)^n}{\pi^2 n^2 + a^4} - \frac{2 a^2 \text{Heaviside}(a)}{\pi^2 n^2 + a^4} - \frac{2 a^2 \text{Heaviside}(-a) e^{a^2} (-1)^n}{\pi^2 n^2 + a^4} + \frac{2 a^2 \text{Heaviside}(-a)}{\pi^2 n^2 + a^4} \right) \cos\left(\frac{n \pi x}{a}\right) \right)$$

(9)

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> STF500 := subs(a = 1, a[0]/2 + Sum(a[n]·cos(n·Pi/L · x), n = 1 ..500)) :
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> plot(STF500, x = -1 ..0)
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>
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