

$$\begin{aligned} &> \text{restart} \\ &> f := \exp(2 \cdot t) \end{aligned} \qquad f := e^{2t} \qquad (1)$$

$$\begin{aligned} &> L := 1 \end{aligned} \qquad L := 1 \qquad (2)$$

$$\begin{aligned} &> a[0] := \frac{1}{L} \cdot \text{int}(f, t = -L..L); \text{evalf}(\%, 4) \end{aligned} \qquad a_0 := -\frac{e^{-2}}{2} + \frac{e^2}{2} \qquad (3)$$

$$3.626$$

$$\begin{aligned} &> a[n] := \text{simplify}\left(\frac{1}{L} \cdot \text{int}\left(f \cdot \cos\left(\frac{n \cdot \text{Pi}}{L} \cdot t\right), t = -L..L\right)\right) \end{aligned} \qquad (4)$$

$$a_n := \frac{(-2 e^{-2} + 2 e^2) \cos(n \pi) + n \pi \sin(n \pi) (e^{-2} + e^2)}{n^2 \pi^2 + 4}$$

$$\begin{aligned} &> b[n] := \text{simplify}\left(\frac{1}{L} \cdot \text{int}\left(f \cdot \sin\left(\frac{n \cdot \text{Pi}}{L} \cdot t\right), t = -L..L\right)\right) \end{aligned} \qquad (5)$$

$$b_n := \frac{n \pi (e^{-2} - e^2) \cos(n \pi) + 2 \sin(n \pi) (e^{-2} + e^2)}{n^2 \pi^2 + 4}$$

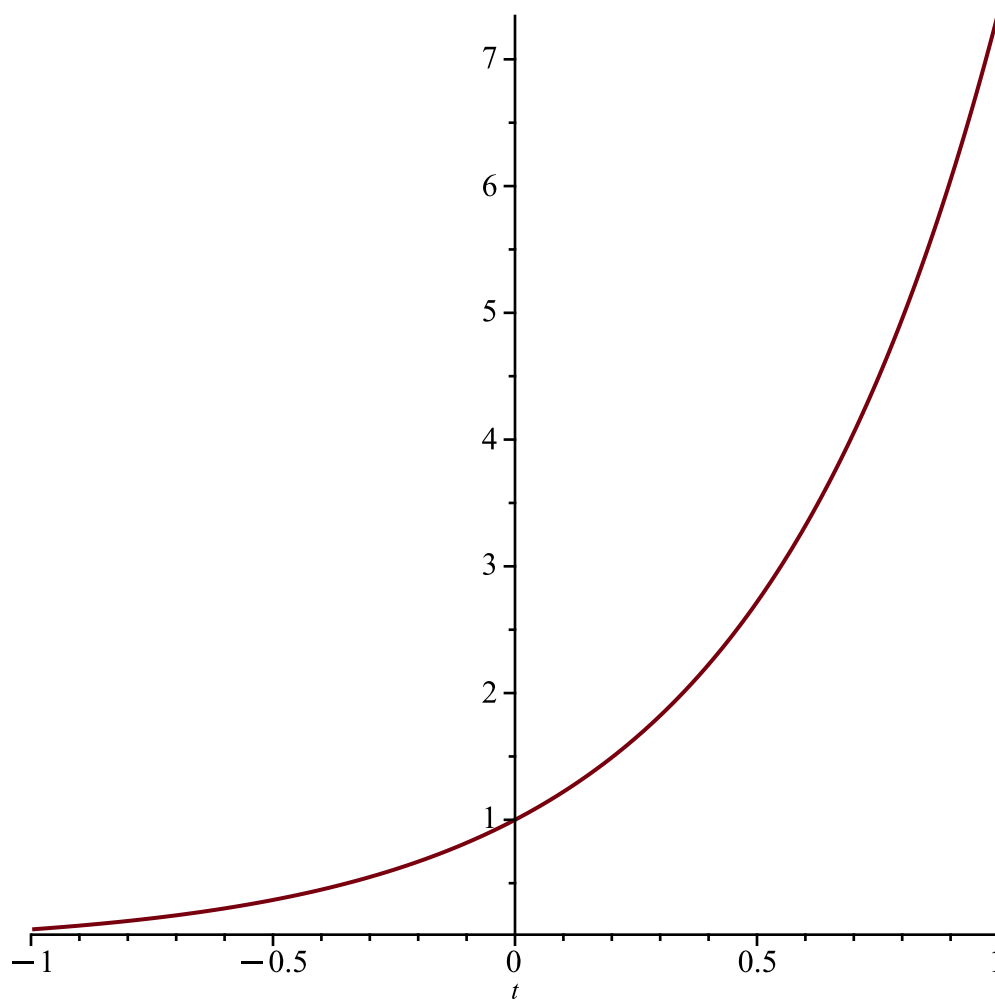
$$\begin{aligned} &> STF := \frac{a[0]}{2} + \text{Sum}\left(a[n] \cdot \cos\left(\frac{n \cdot \text{Pi}}{L} \cdot t\right) + b[n] \cdot \sin\left(\frac{n \cdot \text{Pi}}{L} \cdot t\right), n = 1 .. \text{infinity}\right) \end{aligned} \qquad (6)$$

$$STF := -\frac{e^{-2}}{4} + \frac{e^2}{4}$$

$$+ \sum_{n=1}^{\infty} \left(\frac{((-2 e^{-2} + 2 e^2) \cos(n \pi) + n \pi \sin(n \pi) (e^{-2} + e^2)) \cos(n \pi t)}{n^2 \pi^2 + 4} \right.$$

$$\left. + \frac{(n \pi (e^{-2} - e^2) \cos(n \pi) + 2 \sin(n \pi) (e^{-2} + e^2)) \sin(n \pi t)}{n^2 \pi^2 + 4} \right)$$

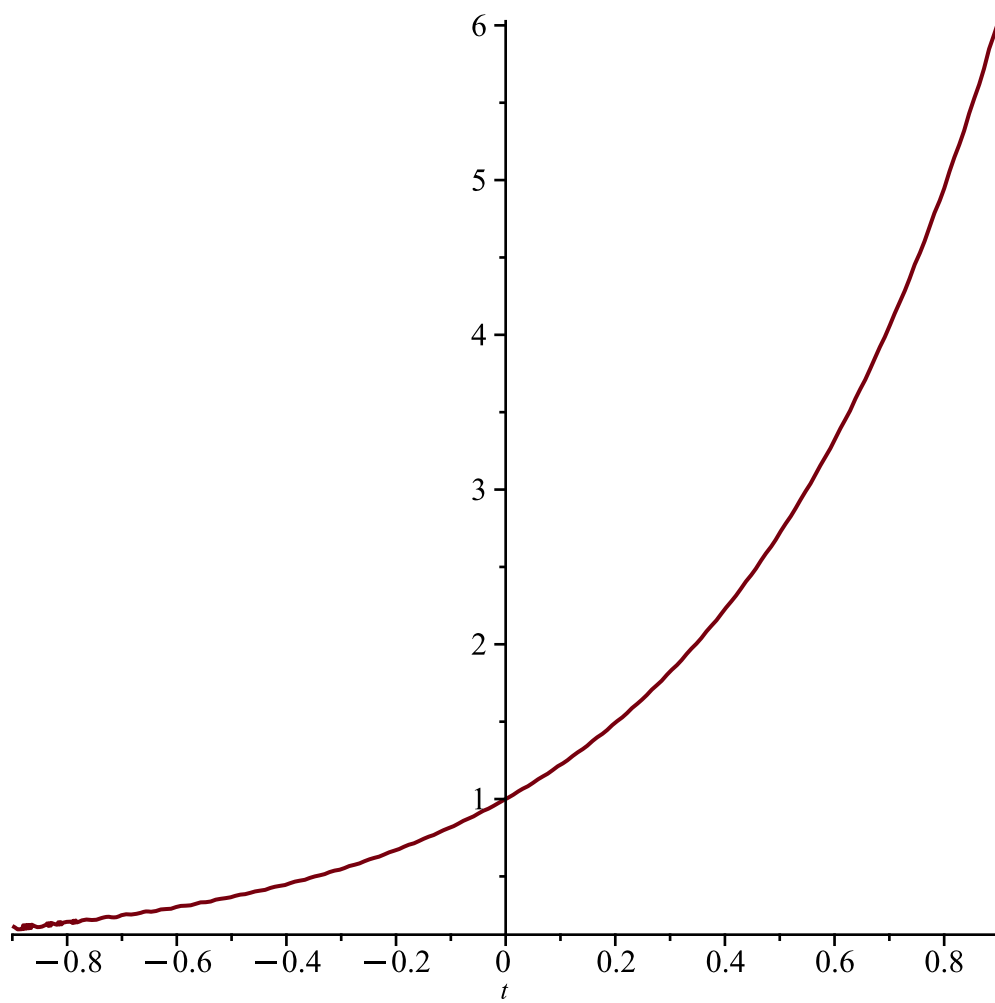
$$> \text{plot}(f, t = -1..1)$$



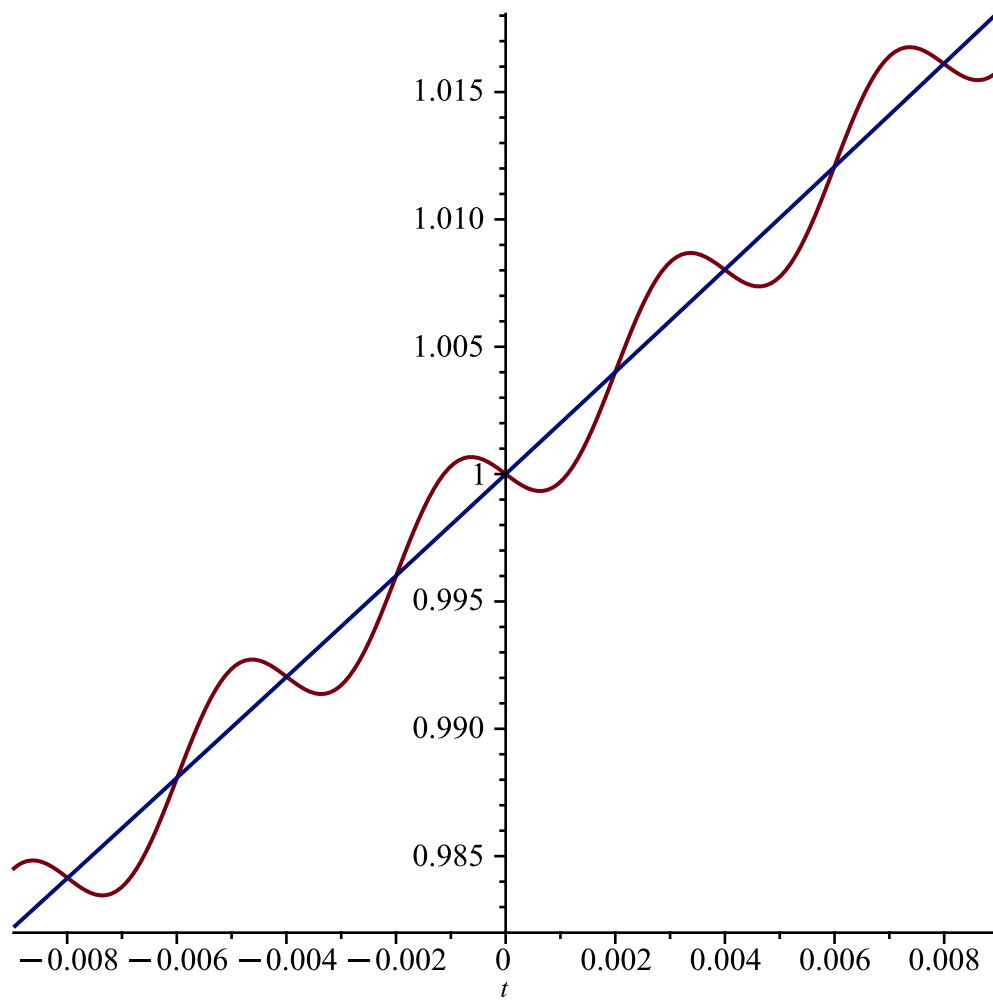
```

> STF500 :=  $\frac{a[0]}{2} + \text{sum}\left(a[n] \cdot \cos\left(\frac{n \cdot \text{Pi}}{L} \cdot t\right) + b[n] \cdot \sin\left(\frac{n \cdot \text{Pi}}{L} \cdot t\right), n = 1 \text{ .. } 500\right) :$ 
> plot(STF500, t = -0.9 .. 0.9)

```



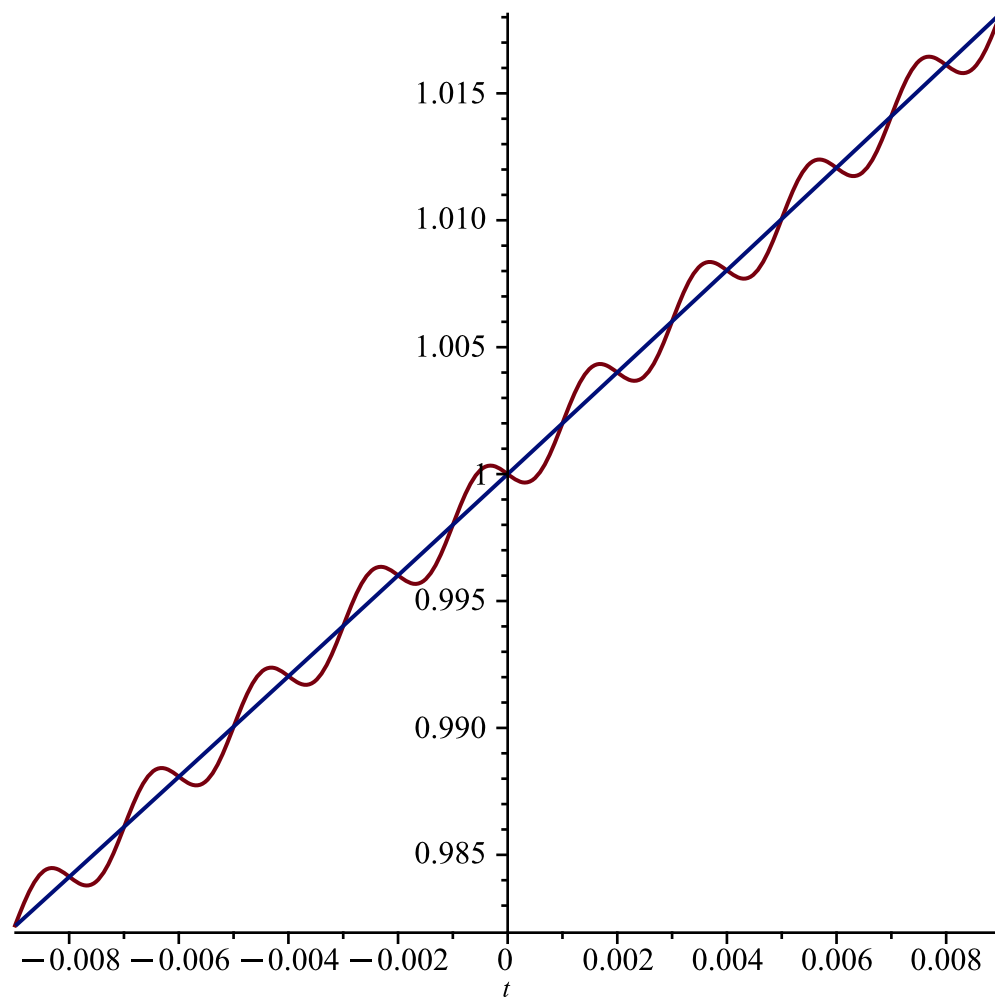
```
> plot( {f, STF500}, t=-0.009..0.009)
```



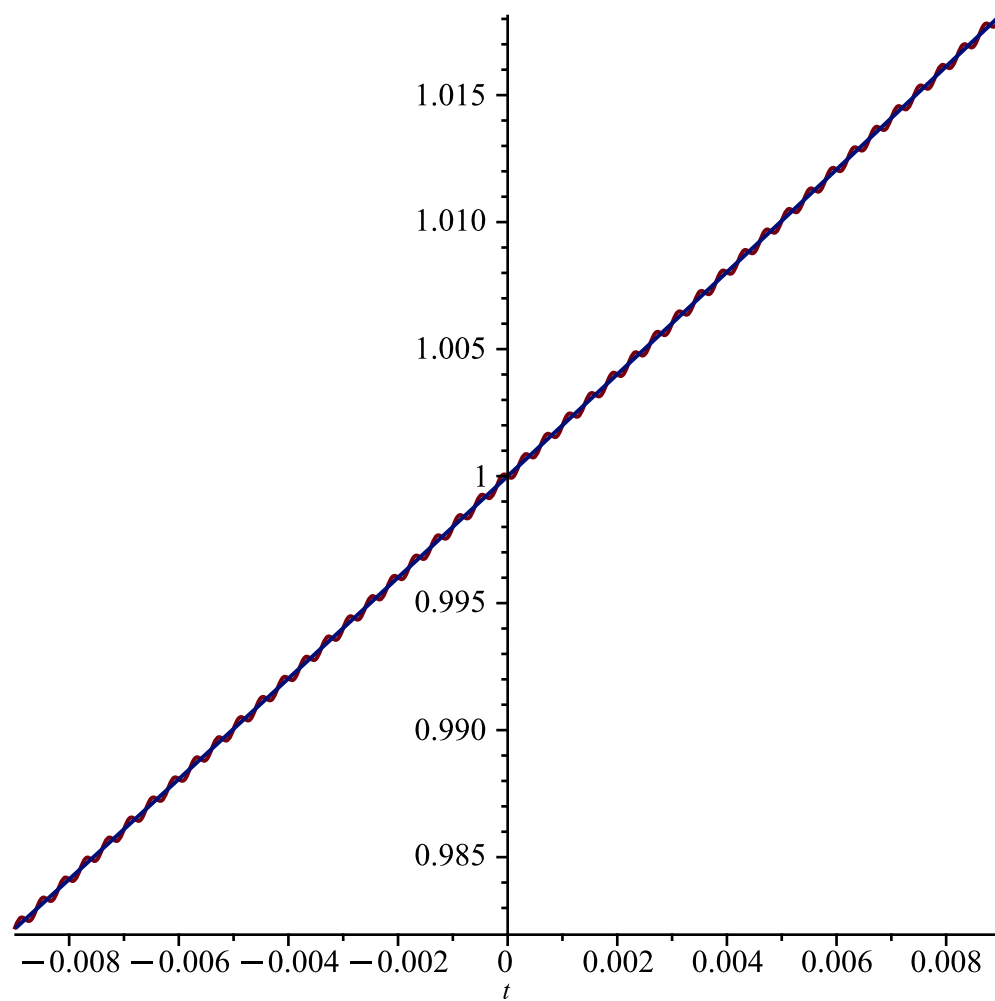
```

> STF1000 :=  $\frac{a[0]}{2} + \text{sum}\left(a[n] \cdot \cos\left(\frac{n \cdot \text{Pi}}{L} \cdot t\right) + b[n] \cdot \sin\left(\frac{n \cdot \text{Pi}}{L} \cdot t\right), n = 1 .. 1000\right) :$ 
> plot({f, STF1000}, t = -0.009 .. 0.009)

```

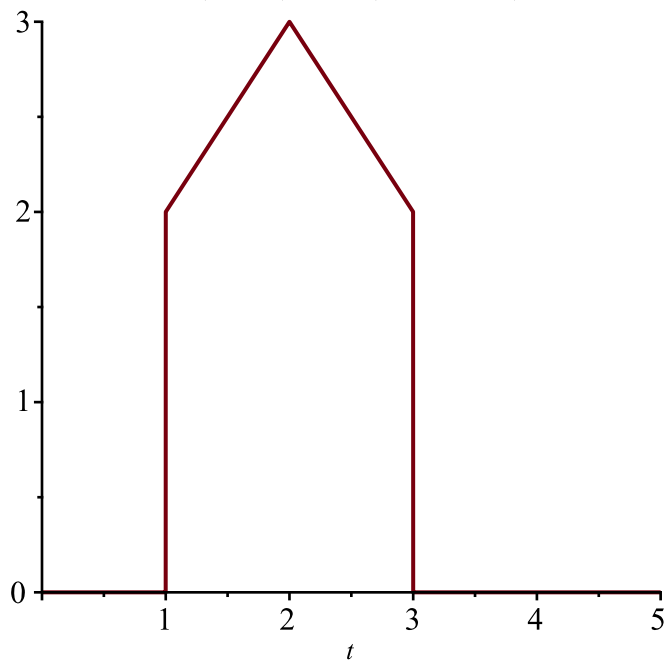


```
> STF5000 :=  $\frac{a[0]}{2} + \text{sum}\left(a[n] \cdot \cos\left(\frac{n \cdot \text{Pi}}{L} \cdot t\right) + b[n] \cdot \sin\left(\frac{n \cdot \text{Pi}}{L} \cdot t\right), n = 1 \dots 5000\right) :$ 
> plot( {f, STF5000}, t = -0.009 .. 0.009 )
```

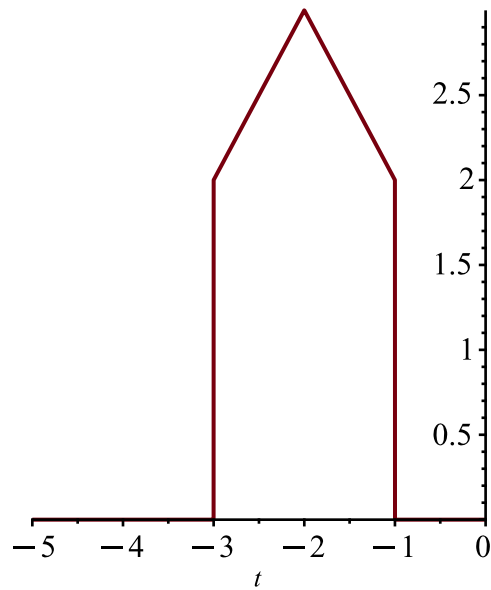


```
> restart
```

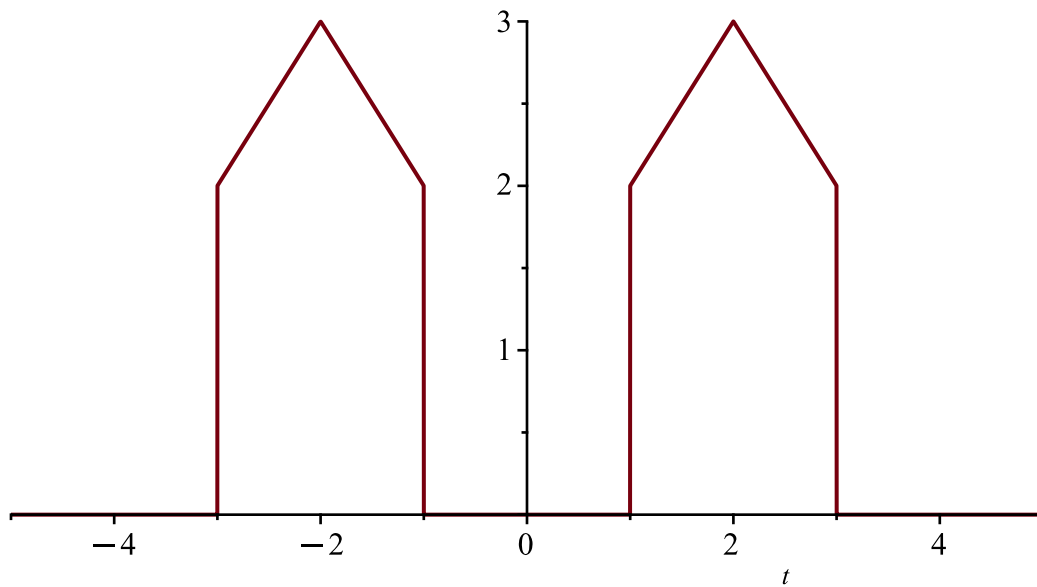
```
> F := 2·Heaviside(t - 1) + (t - 1)·Heaviside(t - 1) - 2·(t - 2)·Heaviside(t - 2) + (t - 3)
·Heaviside(t - 3) - 2·Heaviside(t - 3) : plot(F, t = 0..5)
```



> $G := 2 \cdot \text{Heaviside}(t + 3) + (t + 3) \cdot \text{Heaviside}(t + 3) - 2 \cdot (t + 2) \cdot \text{Heaviside}(t + 2) + (t + 1) \cdot \text{Heaviside}(t + 1) - 2 \cdot \text{Heaviside}(t + 1) : \text{plot}(G, t = -5 .. 0)$



> $H := F + G : \text{plot}(H, t = -5 .. 5)$



> $L := 4$

$L := 4$

(7)

> $a[0] := \frac{1}{L} \cdot \text{int}(H, t = -L .. L) : \text{evalf}(\%, 4)$

2.500

(8)

> $a[n] := \text{simplify}\left(\frac{1}{L} \cdot \text{int}\left(H \cdot \cos\left(\frac{n \cdot \text{Pi}}{L} \cdot t\right), t = -L .. L\right)\right)$

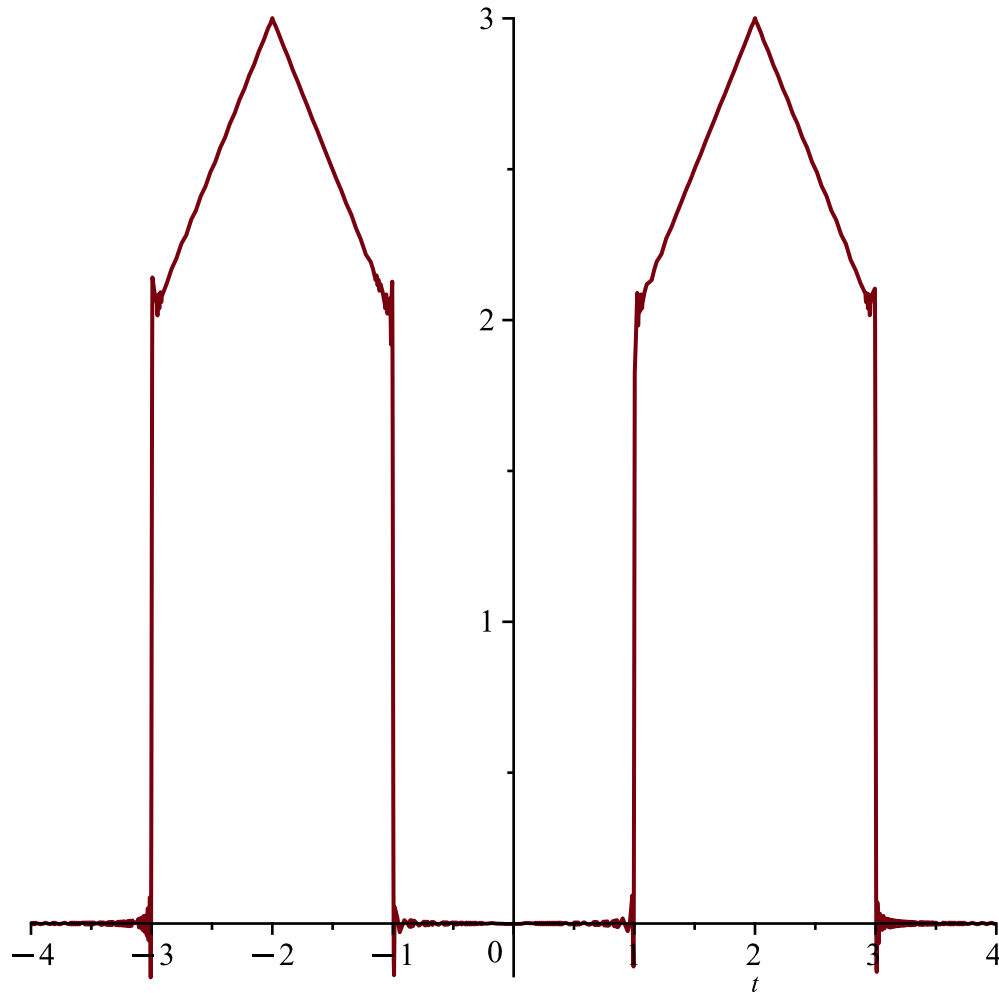
$$a_n := \frac{16 \left(n \pi \sin\left(\frac{n \pi}{4}\right) - 2 \cos\left(\frac{n \pi}{4}\right) + 2 \right) \left(\cos\left(\frac{n \pi}{4}\right)^2 - \frac{1}{2} \right)}{n^2 \pi^2}$$

(9)

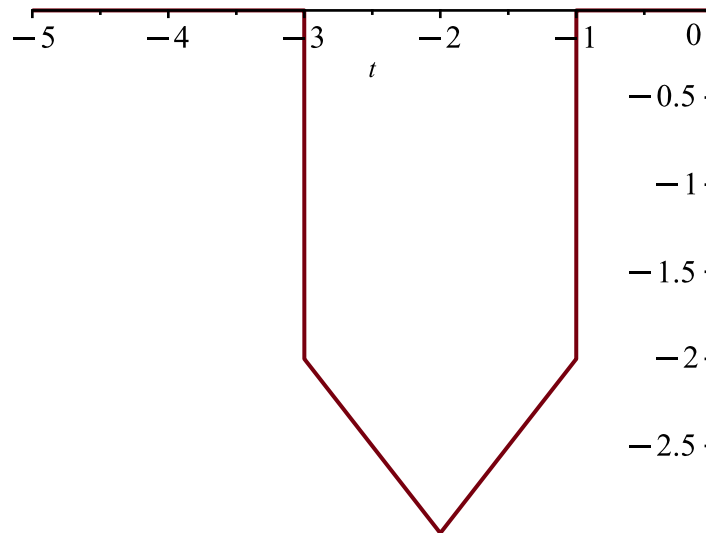
```
> b[n] := simplify( $\frac{1}{L} \cdot \text{int}\left(H \cdot \sin\left(\frac{n \cdot \text{Pi}}{L} \cdot t\right), t = -L..L\right)$ )
 $b_n := 0$ 
```

(10)

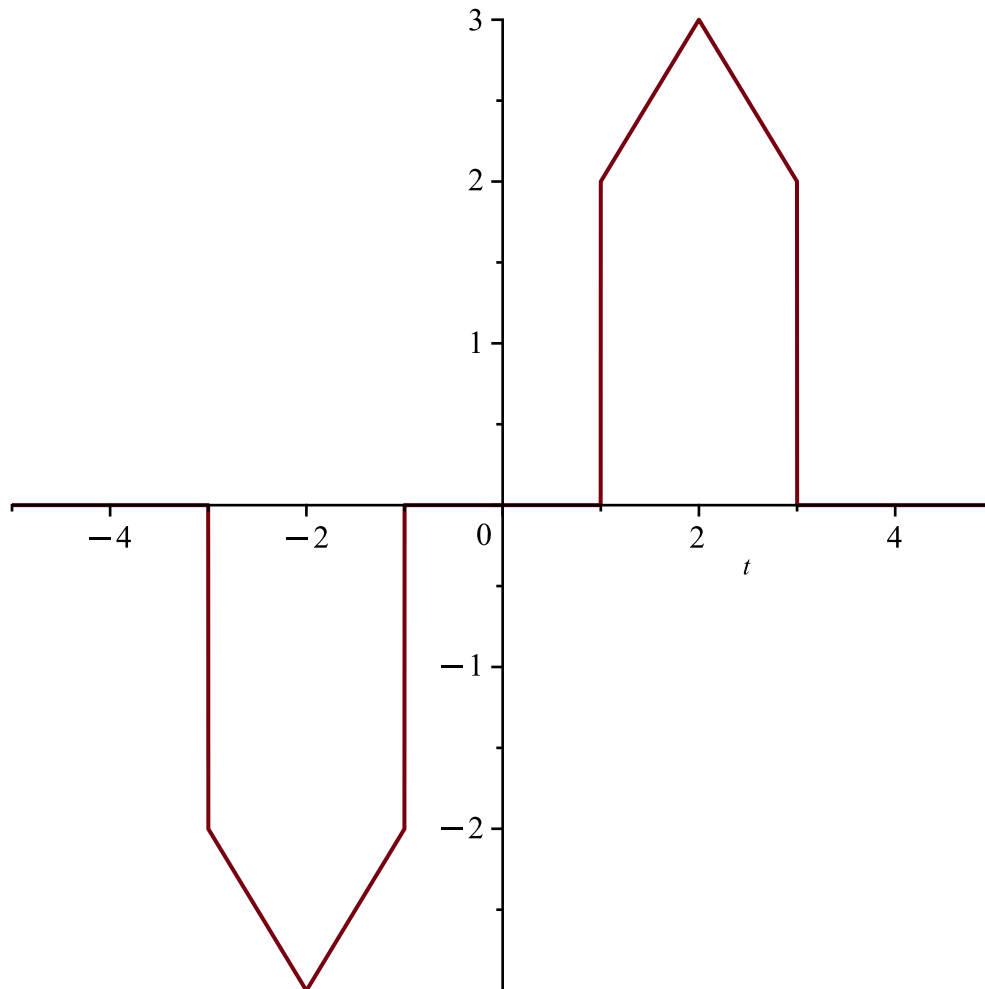
```
> STF500 :=  $\frac{a[0]}{2} + \text{sum}\left(a[n] \cdot \cos\left(\frac{n \cdot \text{Pi}}{L} \cdot t\right), n = 1..500\right)$  :
> plot(STF500, t = -4..4)
```



```
> J := -2·Heaviside(t + 3) - (t + 3)·Heaviside(t + 3) + 2·(t + 2)·Heaviside(t + 2) - (t + 1)
·Heaviside(t + 1) + 2·Heaviside(t + 1) : plot(J, t = -5..0)
```

```
> K := F + J: plot(K, t=-5..5)
```



```
> aa[0] := 1/L * int(K, t=-L..L) : evalf(%, 4)
```

0.

(11)

```
> aa[n] := simplify(1/L * int(K*cos(n*Pi/L*t), t=-L..L))
```

$$aa_n := 0$$

(12)

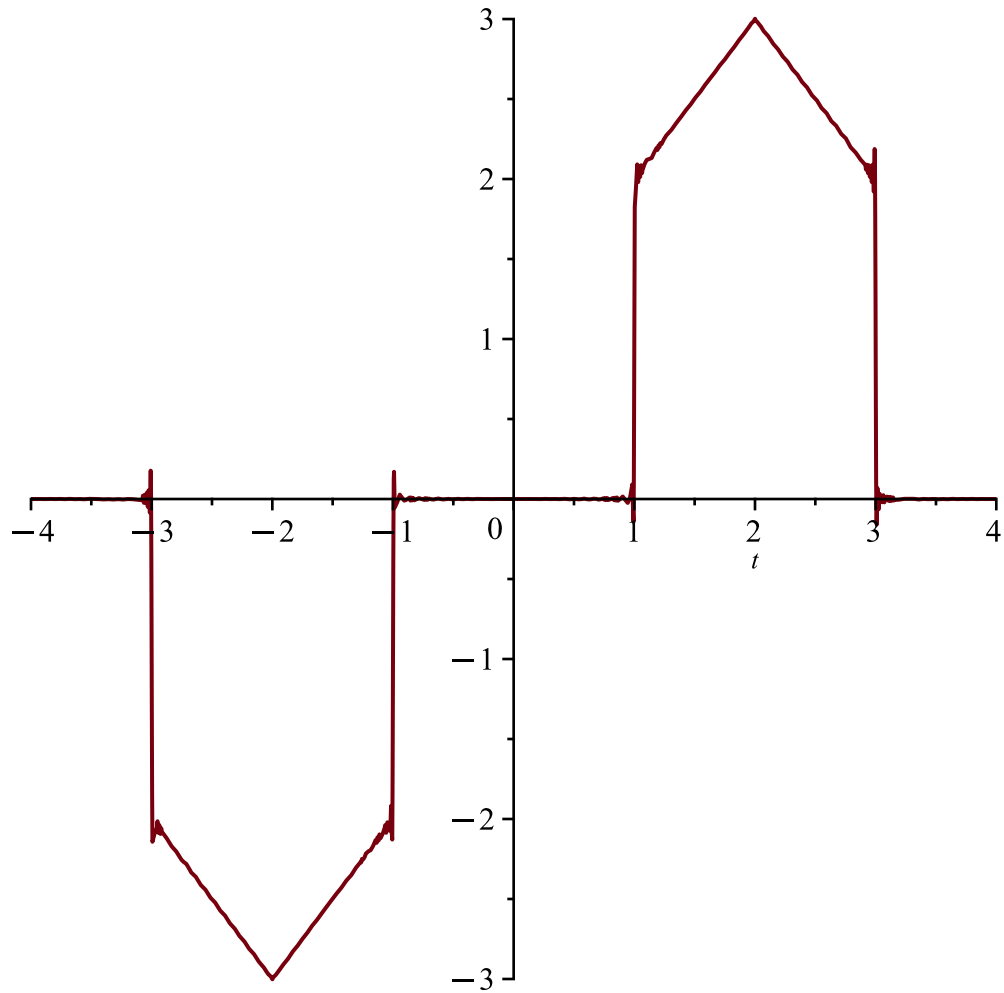
```
> bb[n] := simplify( 1/L · int( K · sin( n·Pi/L · t ), t = -L..L ) )
```

$$bb_n := \frac{16 \cos\left(\frac{n\pi}{4}\right) \sin\left(\frac{n\pi}{4}\right) \left(n\pi \sin\left(\frac{n\pi}{4}\right) - 2 \cos\left(\frac{n\pi}{4}\right) + 2\right)}{n^2 \pi^2}$$

(13)

```
> STFK500 := sum( bb[n] · sin( n·Pi/L · t ), n = 1..500 ) :
```

```
> plot(STFK500, t = -L..L)
```



```
>
```