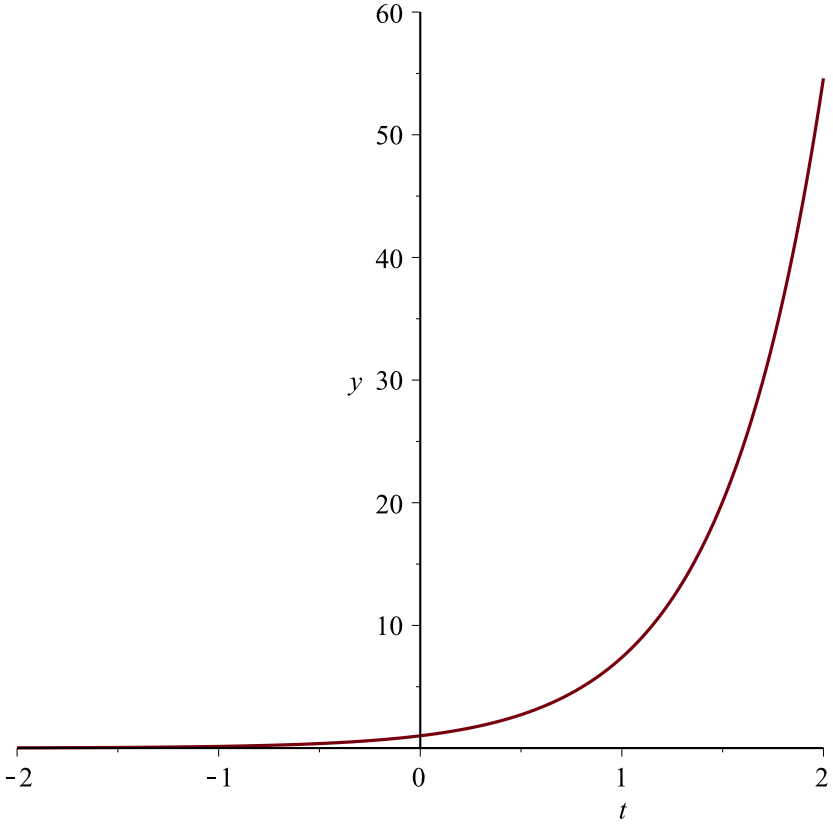
```
> restart
> f := exp(2·t)
```

$$f := e^{2t} \quad (1)$$

```
> plot(f, t=-2..2, y=0..60)
```




```
> L := 2
```

$$L := 2 \quad (2)$$

```
> a[0] := 1/L·int(f, t=-L..L); evalf(%, 3)
```

$$a_0 := -\frac{1}{4}\,e^{-4} + \frac{1}{4}\,e^{4}$$

$$13.6 \quad (3)$$

```
> a[n] := 1/L·int(f·cos(n·Pi·t/L), t=-L..L)
```

$$a_n := \frac{e^4 \sin(n\pi)\,\pi n + e^{-4}\sin(n\pi)\,\pi n + 4\,e^4\cos(n\pi) - 4\,e^{-4}\cos(n\pi)}{\pi^2 n^2 + 16} \quad (4)$$

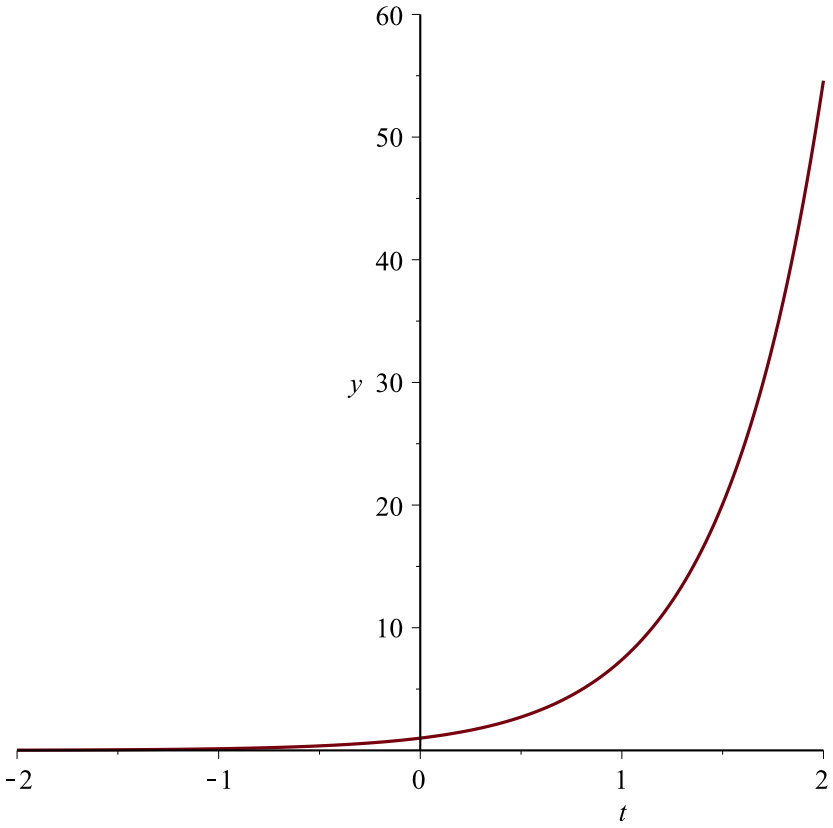
```
> b[n] := 1/L·int(f·sin(n·Pi·t/L), t=-L..L)
```

$$b_n := \frac{-e^4 \cos(n\pi)\,\pi n + e^{-4}\cos(n\pi)\,\pi n + 4\,e^4 \sin(n\pi) + 4\,e^{-4}\sin(n\pi)}{\pi^2 n^2 + 16} \quad (5)$$

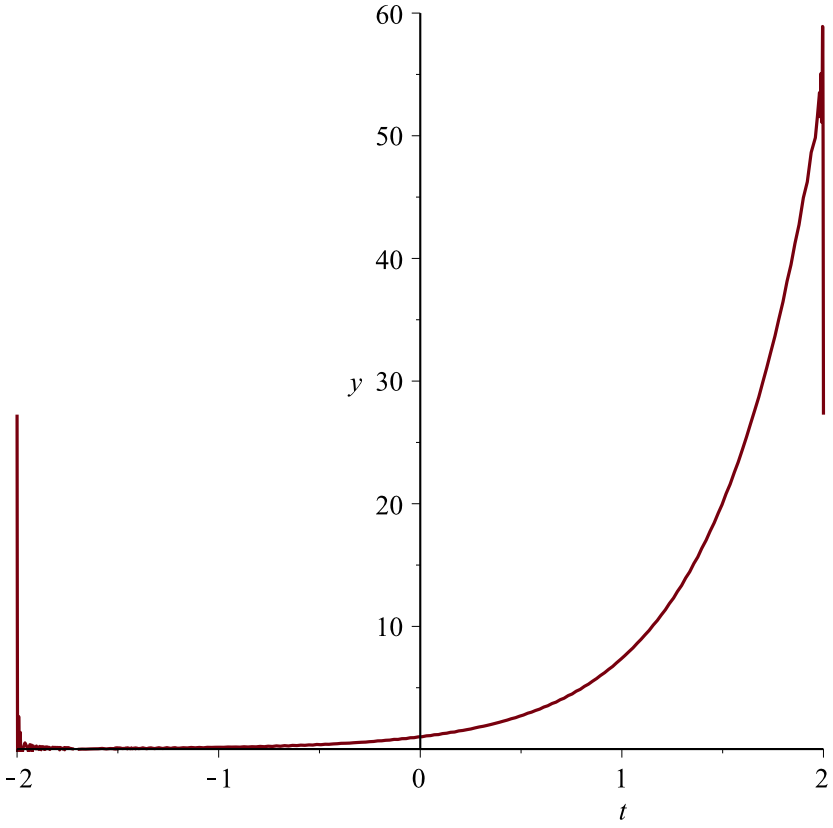
```
> STF := a[0]/2 + Sum(a[n]·cos(n·Pi·t/L) + b[n]·sin(n·Pi·t/L), n = 1 ..infinity)
```

$$STF := -\frac{1}{8}e^{-4} + \frac{1}{8}e^4 + \sum_{n=1}^{\infty} \left(\frac{\left(e^4 \sin(n\pi)\,\pi n + e^{-4}\sin(n\pi)\,\pi n + 4\,e^4\cos(n\pi) - 4\,e^{-4}\cos(n\pi)\right)\cos\left(\frac{1}{2}n\pi t\right)}{\pi^2 n^2 + 16} + \frac{1}{\pi^2 n^2 + 16}\left(\left(-e^4\cos(n\pi)\,\pi n + e^{-4}\cos(n\pi)\,\pi n + 4\,e^4\sin(n\pi) + 4\,e^{-4}\sin(n\pi)\right)\sin\left(\frac{1}{2}n\pi t\right)\right)\right) \quad (6)$$

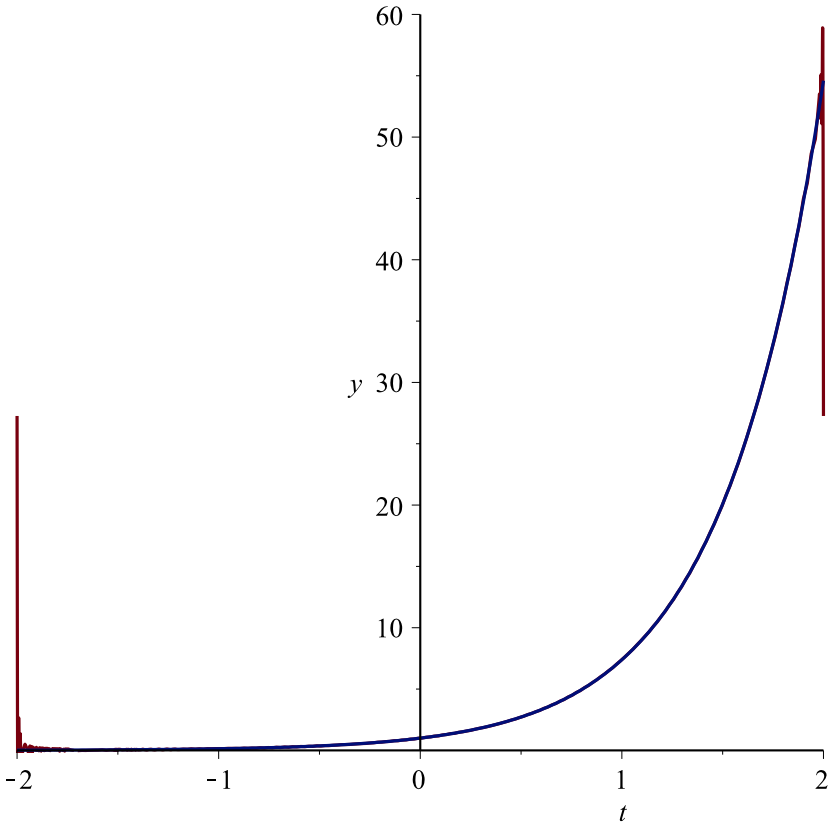
```
> STF500 := a[0]/2 + sum(a[n]·cos(n·Pi·t/L) + b[n]·sin(n·Pi·t/L), n = 1 ..500) :
> plot(f, t = -2 ..2, y = 0 ..60)
```



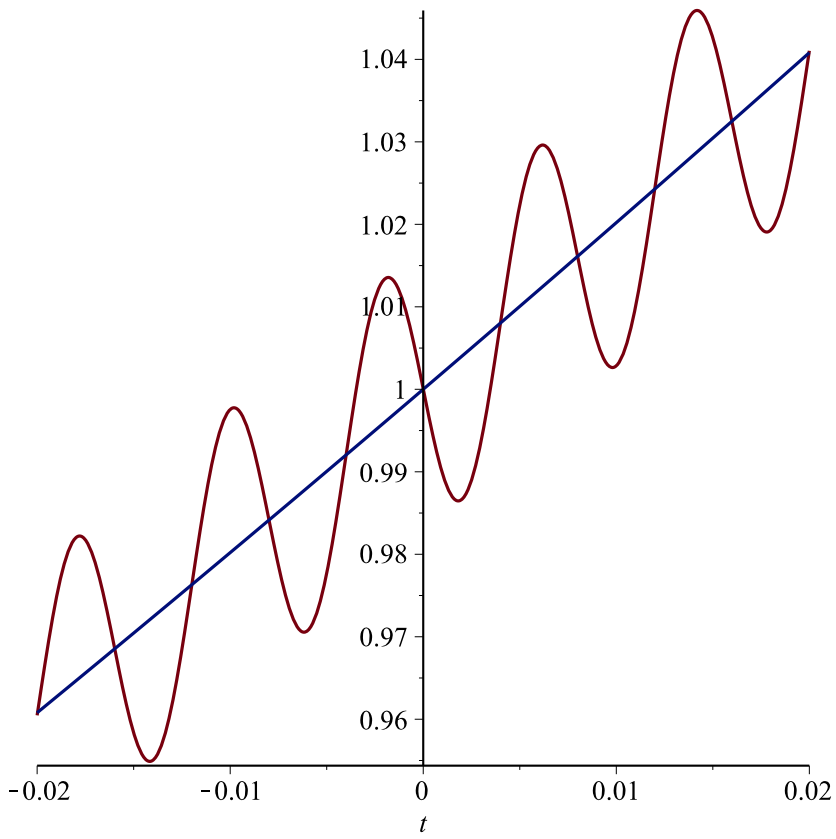
> $plot(STF500, t=-2..2, y=0..60)$



> $plot(\{f, STF500\}, t=-2..2, y=0..60)$



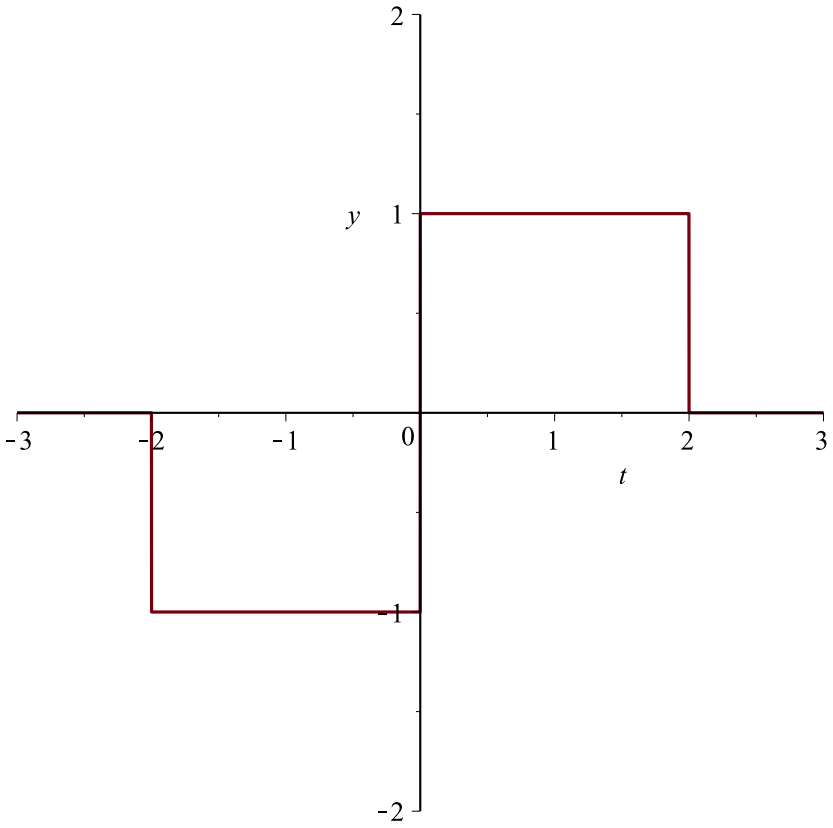
> $plot(\{f, STF500\}, t = -0.02 .. 0.02)$




```
> restart
> g := -Heaviside(t + 2) + 2·Heaviside(t) - Heaviside(t - 2)
```

$$g := -\text{Heaviside}(t+2) + 2\,\text{Heaviside}(t) - \text{Heaviside}(t-2) \quad \textbf{(7)}$$

```
> plot(g, t = -3..3, y = -2..2)
```



> $L := 3$

$$L := 3 \tag{8}$$

> $a[0] := \frac{1}{L} \cdot int(g, t = -3..3)$

$$a_0 := 0 \tag{9}$$

> $a[n] := \frac{1}{L} \cdot int\left(g \cdot \cos\left(\frac{n \cdot \mathrm{Pi} \cdot t}{L}\right), t = -3..3\right)$

$$a_n := 0 \tag{10}$$

> $b[n] := \frac{1}{L} \cdot int\left(g \cdot \sin\left(\frac{n \cdot \mathrm{Pi} \cdot t}{L}\right), t = -3..3\right)$

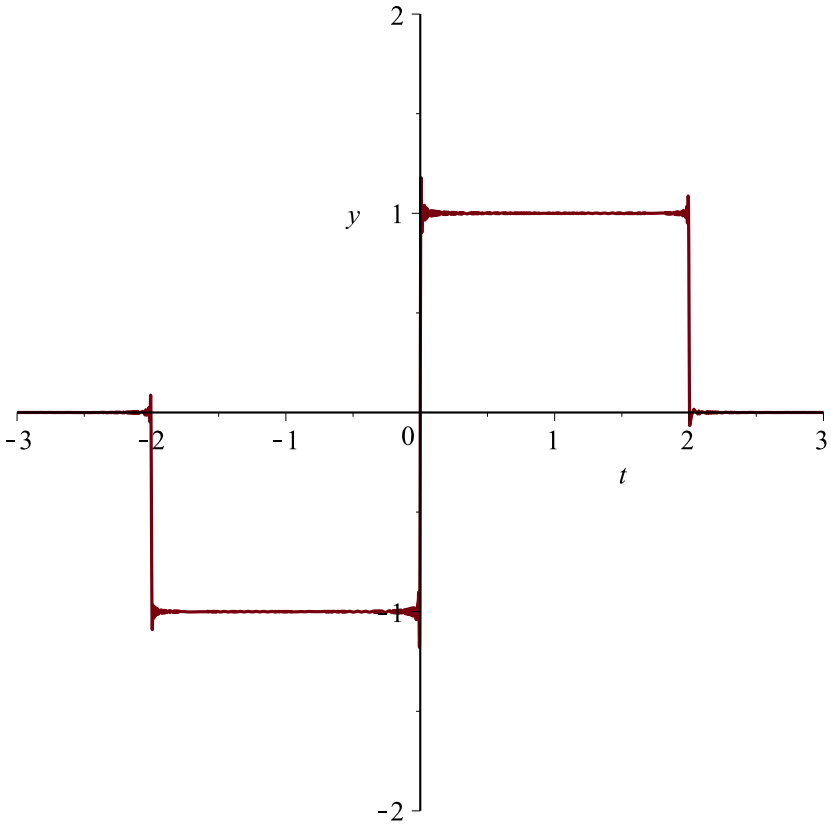
$$b_n := -\frac{2\cos\left(\frac{2}{3} n \pi\right)}{n \pi} + \frac{2}{n \pi} \tag{11}$$

> $STF := Sum\left(b[n] \cdot \sin\left(\frac{n \cdot \mathrm{Pi} \cdot t}{L}\right), n = 1..infinity\right)$

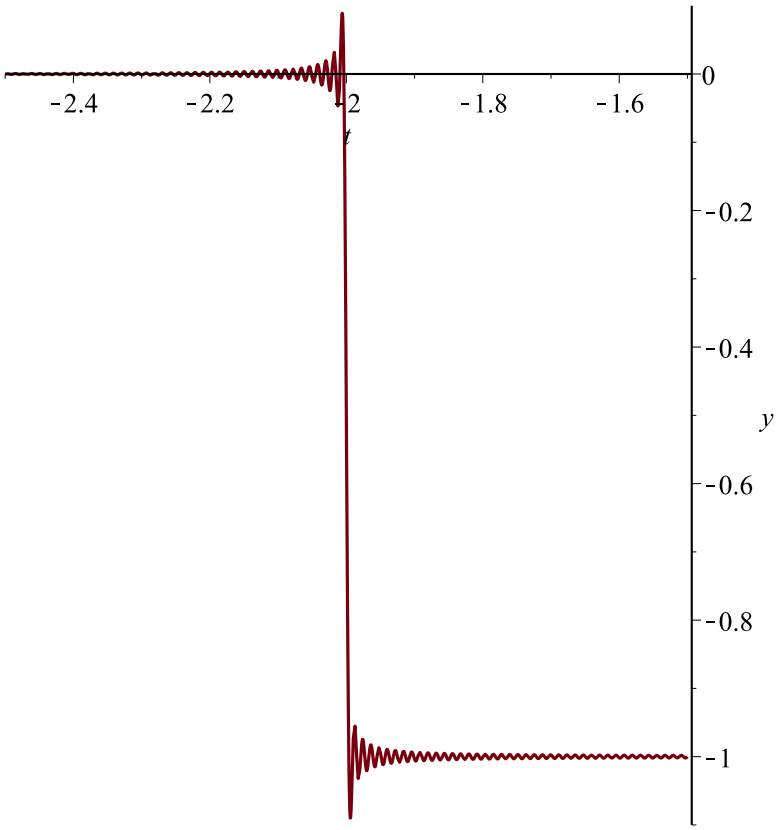
(12)

$$STF := \sum_{n=1}^{\infty} \left(-\frac{2\cos\left(\frac{2}{3} n \pi\right)}{n \pi} + \frac{2}{n \pi} \right) \sin\left(\frac{1}{3} n \pi t\right) \quad (12)$$

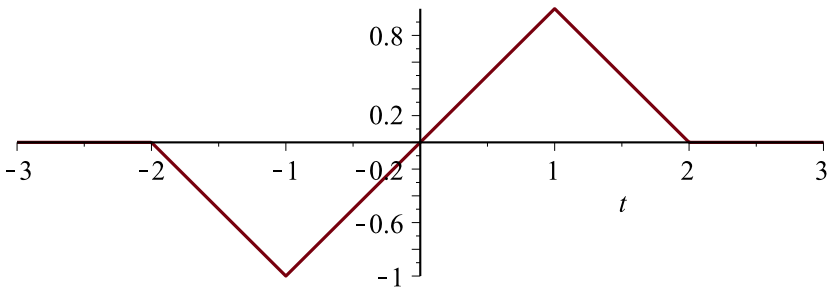
```
> STF500 := sum(b[n]·sin((n·Pi·t)/L), n = 1..500):
> plot(STF500, t = -3..3, y = -2..2)
```




```
> plot(STF500, t = -2.5..-1.5, y = -1.1..0.1, scaling = CONSTRAINED)
```




```
> restart
> ff := -(t+2)·Heaviside(t+2) + 2·(t+1)·Heaviside(t+1) - 2·(t-1)·Heaviside(t-1)
      + (t-2)·Heaviside(t-2) : plot(ff, t=-3..3, scaling=CONSTRAINED)
```



> $L := 2$

$$L := 2 \tag{13}$$

> $a[0] := \frac{1}{L} \cdot int(ff, t = -L..L)$

$$a_0 := 0 \tag{14}$$

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

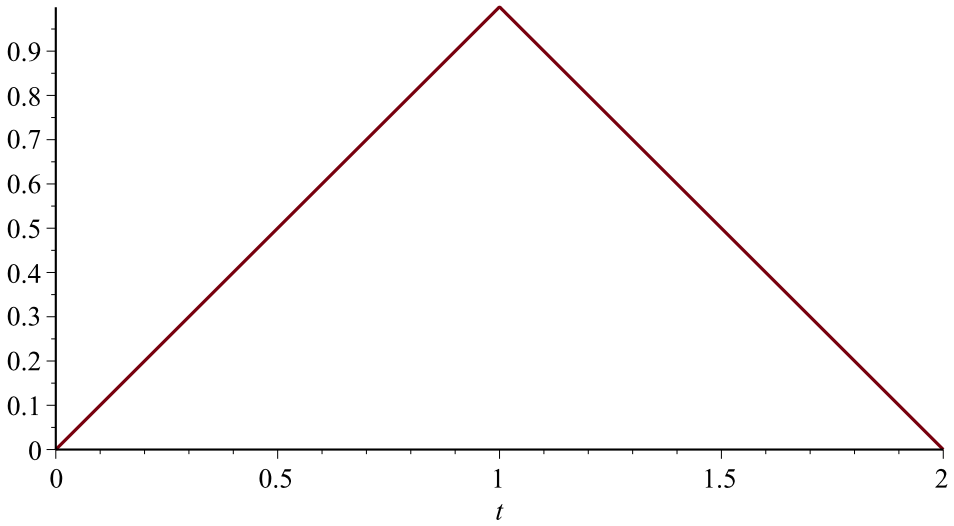
$$a_n := 0 \tag{15}$$

> $b[n] := \frac{1}{L} \cdot int\left(ff \cdot \sin\left(\frac{n \cdot \mathrm{Pi} \cdot t}{L}\right), t = -L..L\right)$

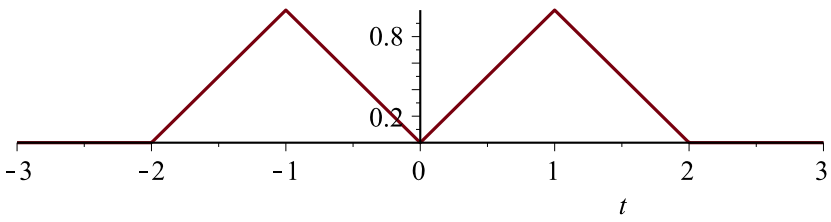
$$b_n := \frac{1}{2} \, \frac{-8 \sin(n\pi) + 16 \sin\left(\frac{1}{2} n \pi\right)}{n^2 \pi^2} \tag{16}$$

> $STF500 := sum\left(b[n] \cdot \sin\left(\frac{n \cdot \mathrm{Pi} \cdot t}{L}\right), n = 1..500\right) :$

> $plot(STF500, t = 0..L, scaling = CONSTRAINED)$




```
> gg := (t + 2)·Heaviside(t + 2) - 2·(t + 1)·Heaviside(t + 1) + 2 t·Heaviside(t) - 2·(t - 1)
      ·Heaviside(t - 1) + (t - 2)·Heaviside(t - 2) : plot(gg, t = -3 ..3, scaling
      = CONSTRAINED)
```



> $aa[0] := \frac{1}{L} \cdot int(gg, t = -L..L)$

$$aa_0 := 1 \tag{17}$$

> $aa[n] := \frac{1}{L} \cdot int\left(gg \cdot \cos\left(\frac{n \cdot \mathrm{Pi} \cdot t}{L}\right), t = -L..L\right)$

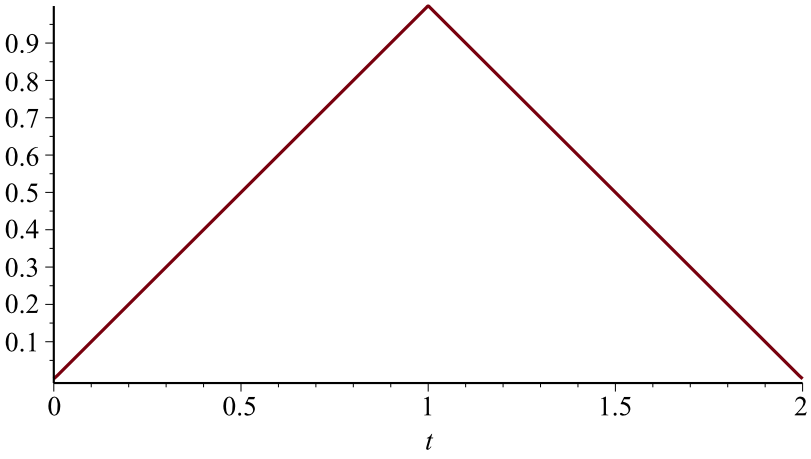
$$aa_n := \frac{1}{2} \, \frac{16 \cos\left(\frac{1}{2} n \pi\right) - 8 \cos(n \pi) - 8}{n^2 \pi^2} \tag{18}$$

> $bb[n] := \frac{1}{L} \cdot int\left(gg \cdot \sin\left(\frac{n \cdot \mathrm{Pi} \cdot t}{L}\right), t = -L..L\right)$

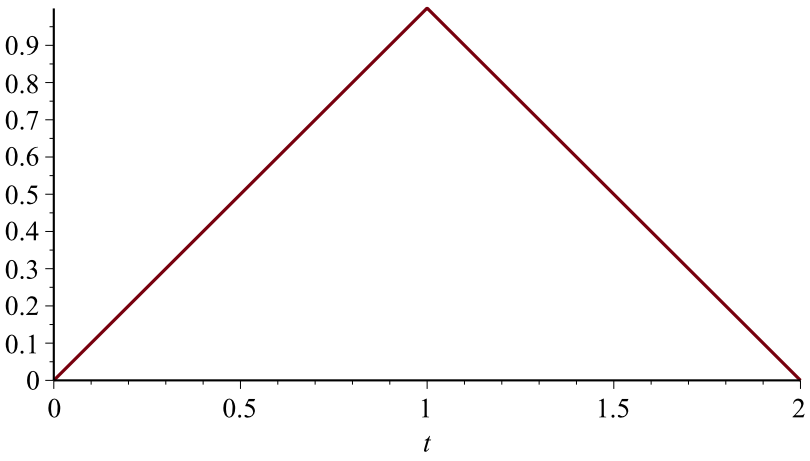
$$bb_n := 0 \tag{19}$$

> $STFG500 := \frac{aa[0]}{2} + sum\left(aa[n] \cdot \cos\left(\frac{n \cdot \mathrm{Pi} \cdot t}{L}\right), n = 1..500\right) :$

> $plot(STFG500, t = 0..L, scaling = CONSTRAINED)$



> $plot(STF500, t = 0..L, scaling = CONSTRAINED)$


0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.5
1
1.5
2
t