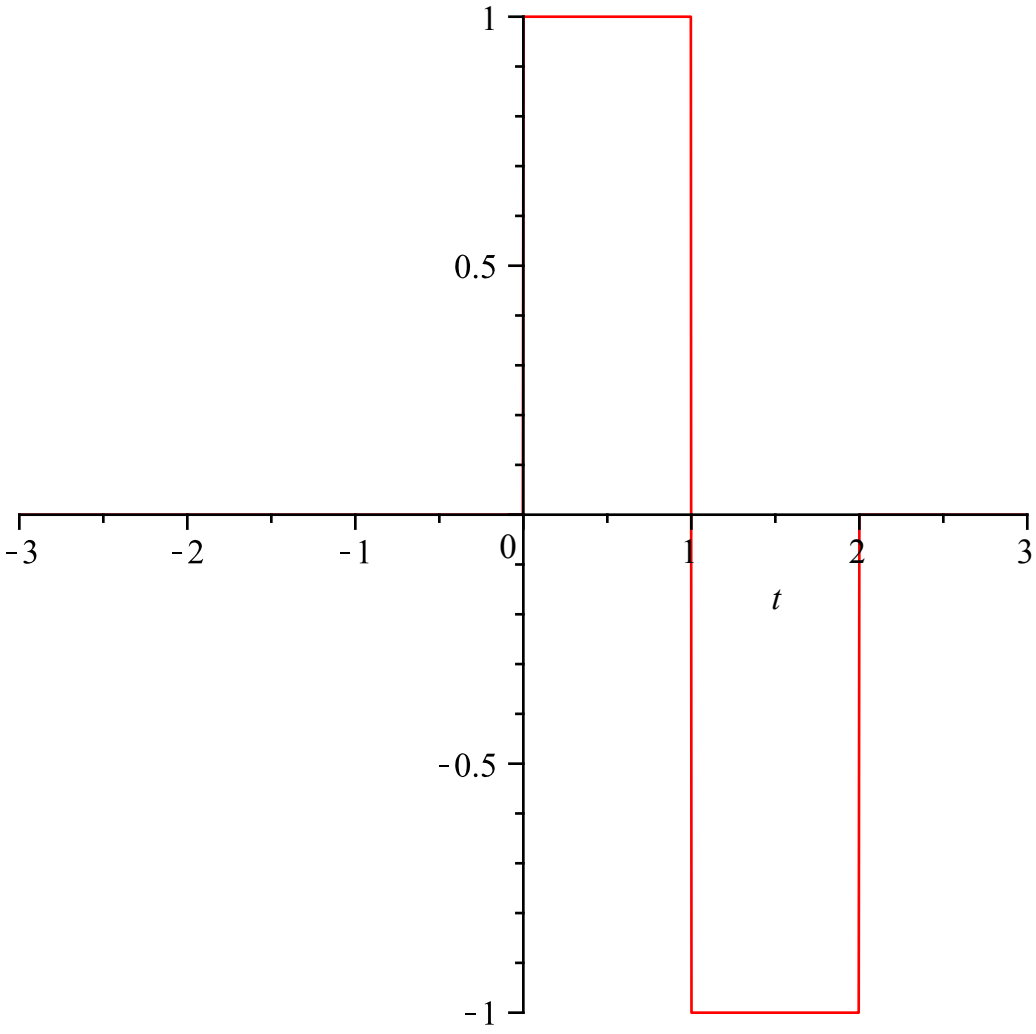
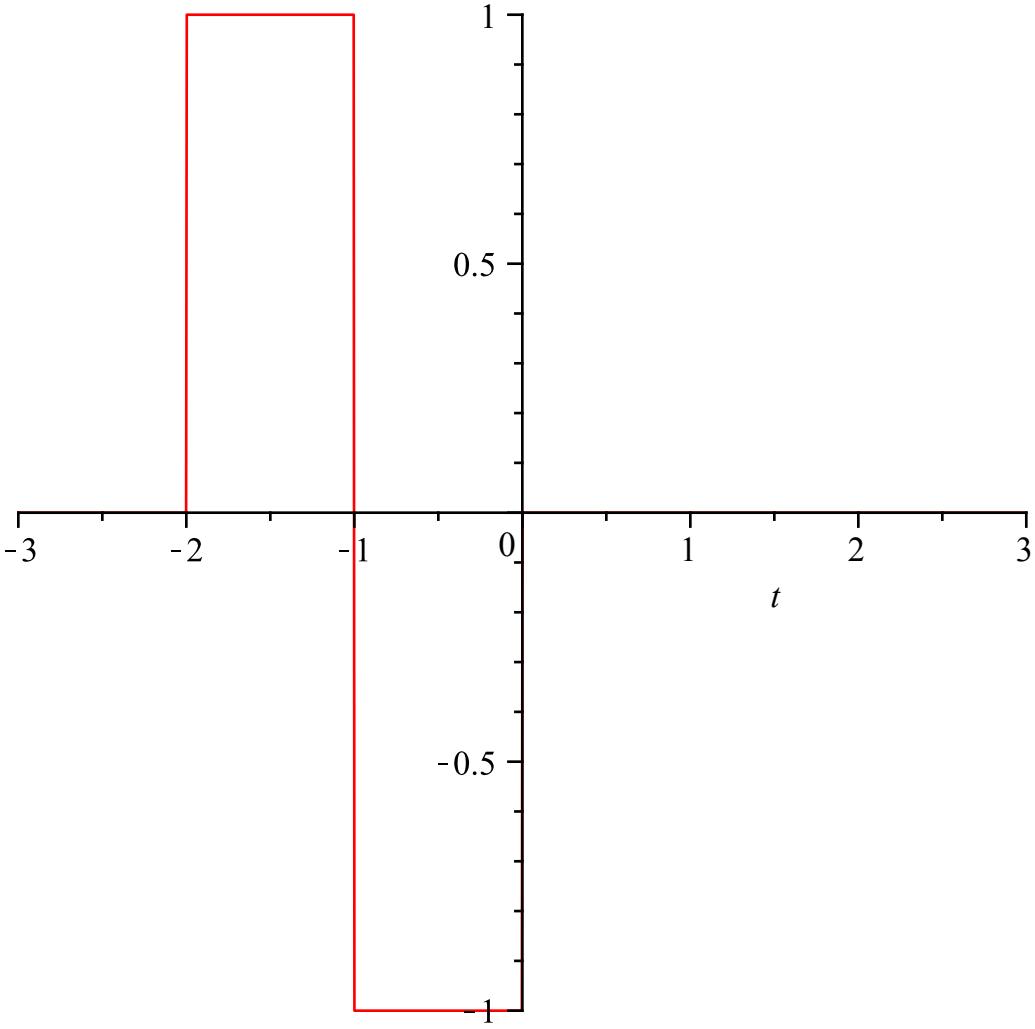
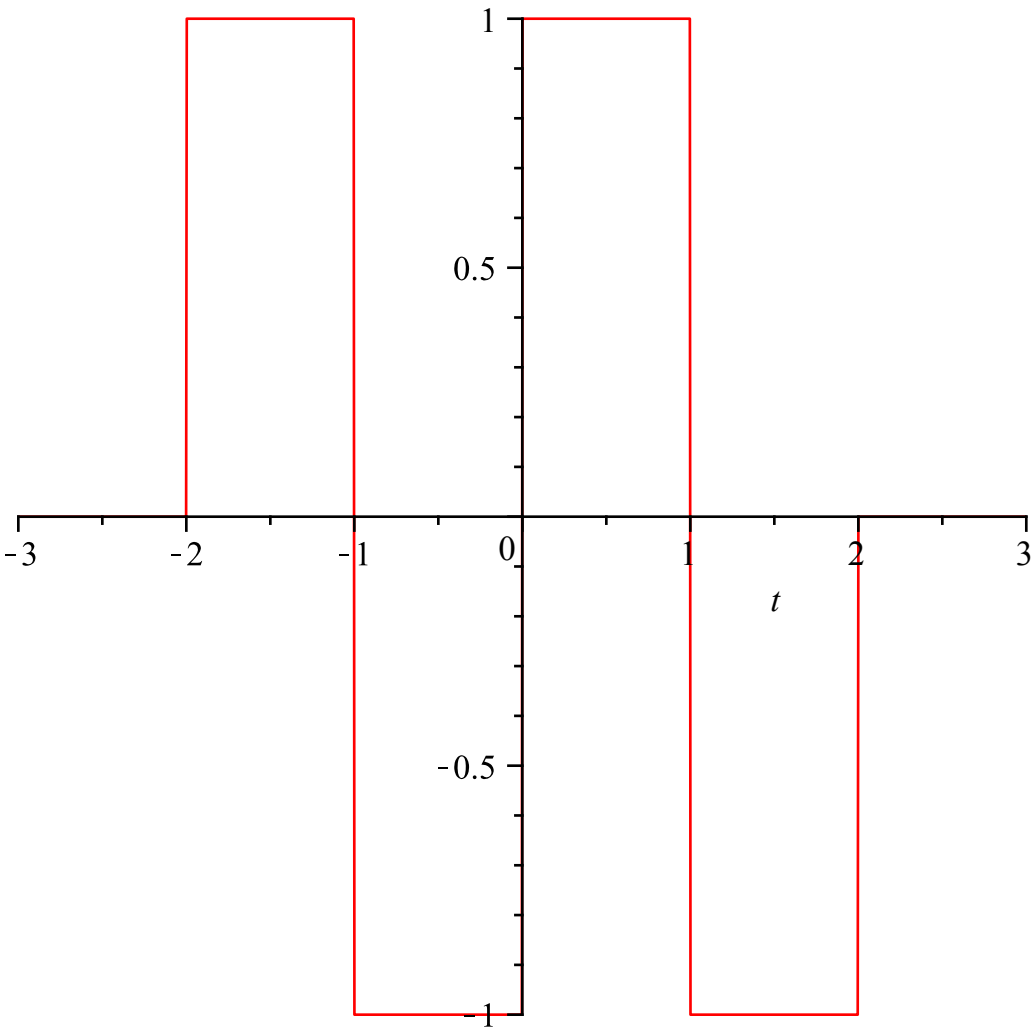
```
> restart
> f := Heaviside(t) - 2·Heaviside(t - 1) + Heaviside(t - 2) : plot(f, t = -3 ..3)
```




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




```
> h := f + g : plot(h, t = -3 ..3)
```



> $L := 3$

$$L := 3 \quad \textbf{(1)}$$

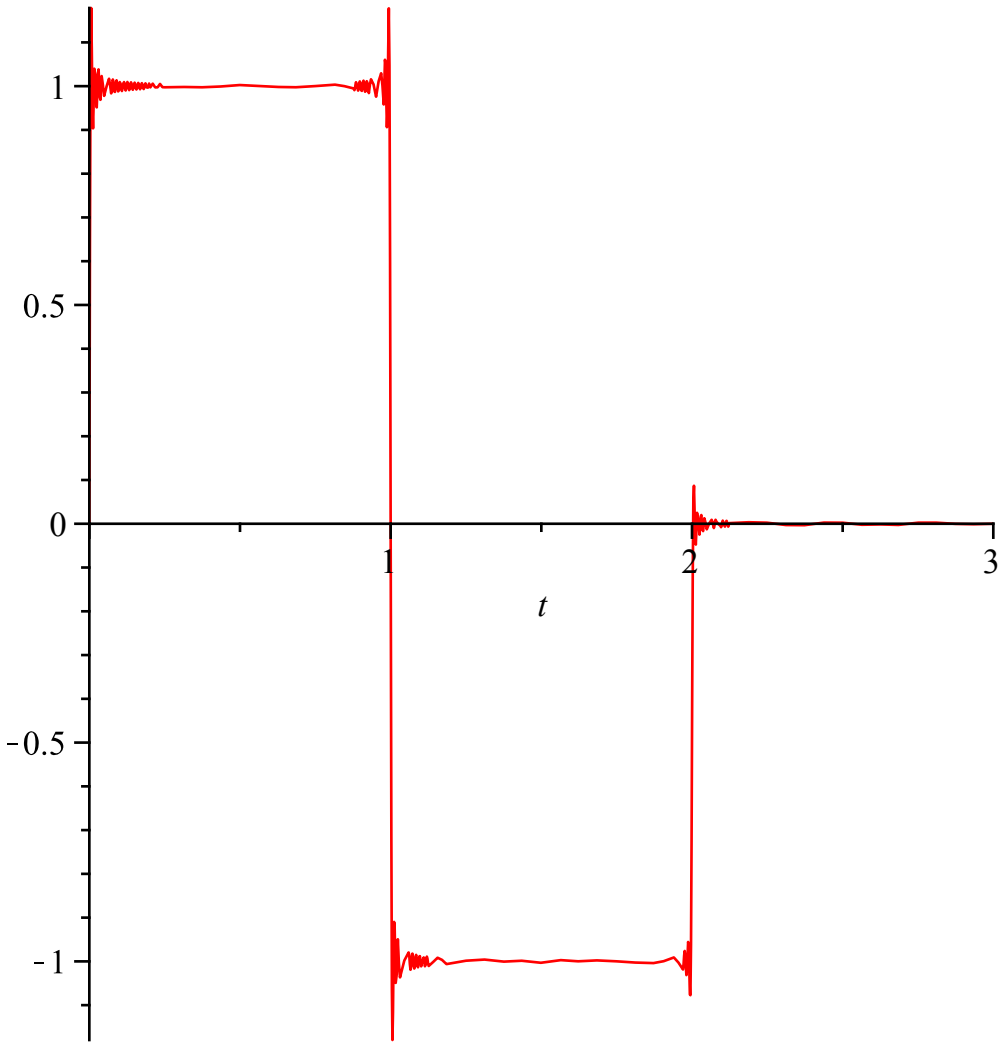
> $a_n := \left(\frac{1}{L}\right) \cdot int\left(h \cdot \cos\left(\frac{n \cdot \mathrm{Pi} \cdot t}{L}\right), t = -L..L\right)$

$$a_n := 0 \quad \textbf{(2)}$$

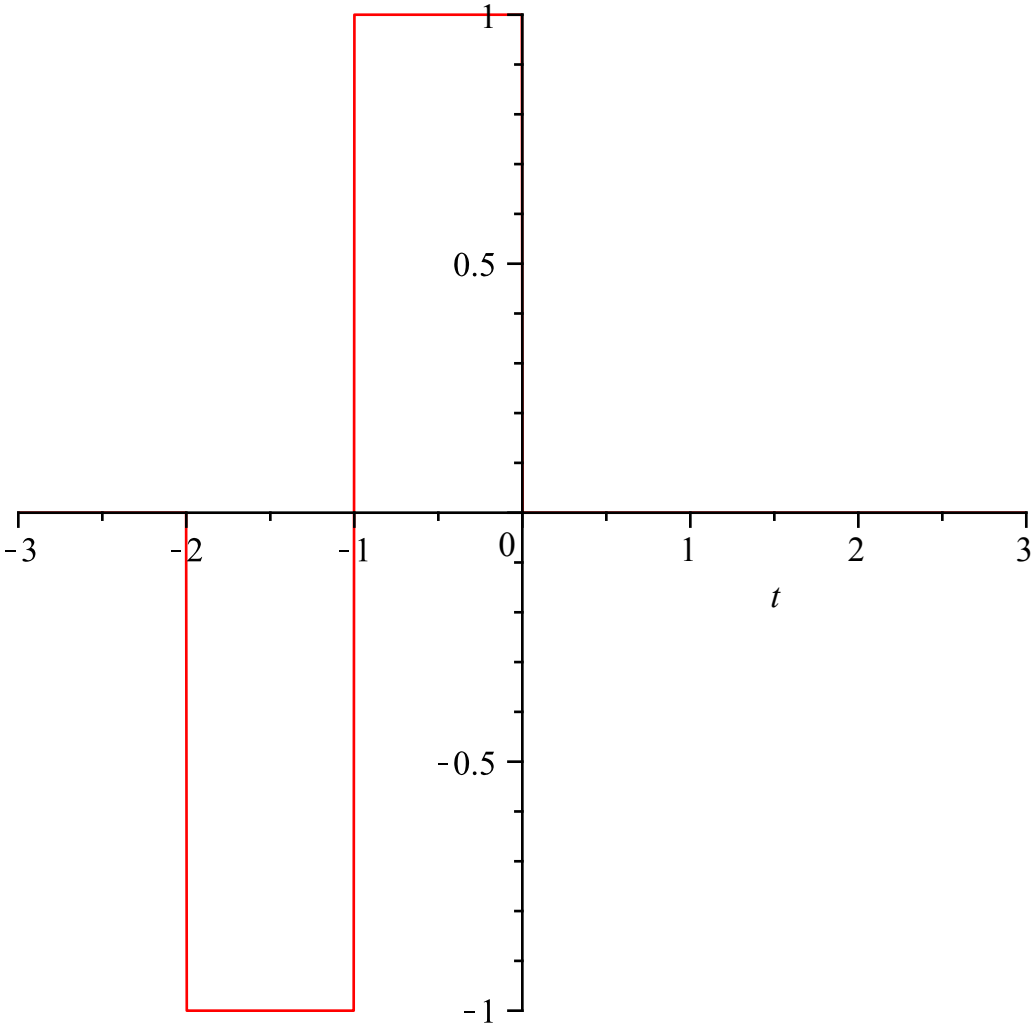
> $b_n := \left(\frac{1}{L}\right) \cdot int\left(h \cdot \sin\left(\frac{n \cdot \mathrm{Pi} \cdot t}{L}\right), t = -L..L\right) :$

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

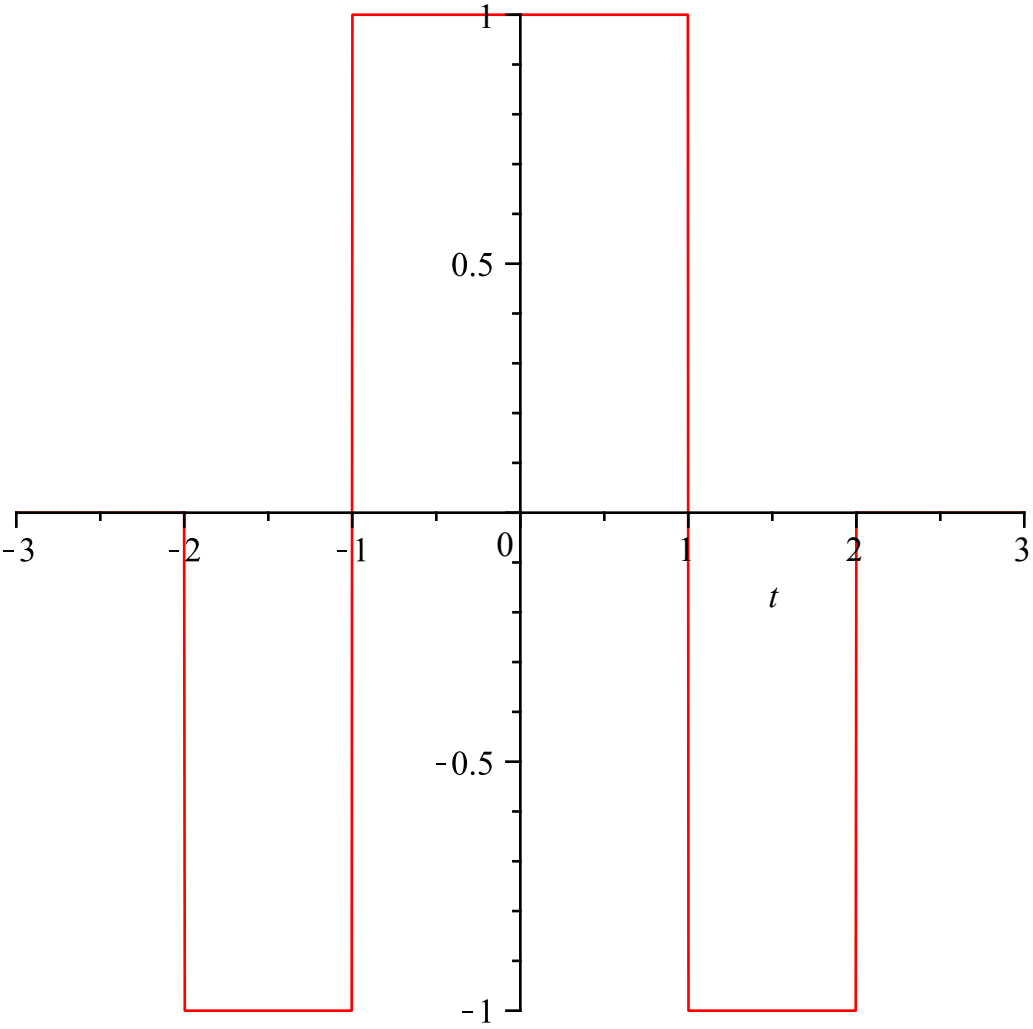
> $plot\left(STF_{500}, t = 0..3\right)$



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



> $l := f + k : plot(l, t = -3 .. 3)$



> $C := \frac{a_0}{2}; a_0 := \left(\frac{1}{L}\right) \cdot int(l, t = -L..L)$

$$C := \frac{1}{2} a_0$$

$$a_0 := 0 \quad \textbf{(3)}$$

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

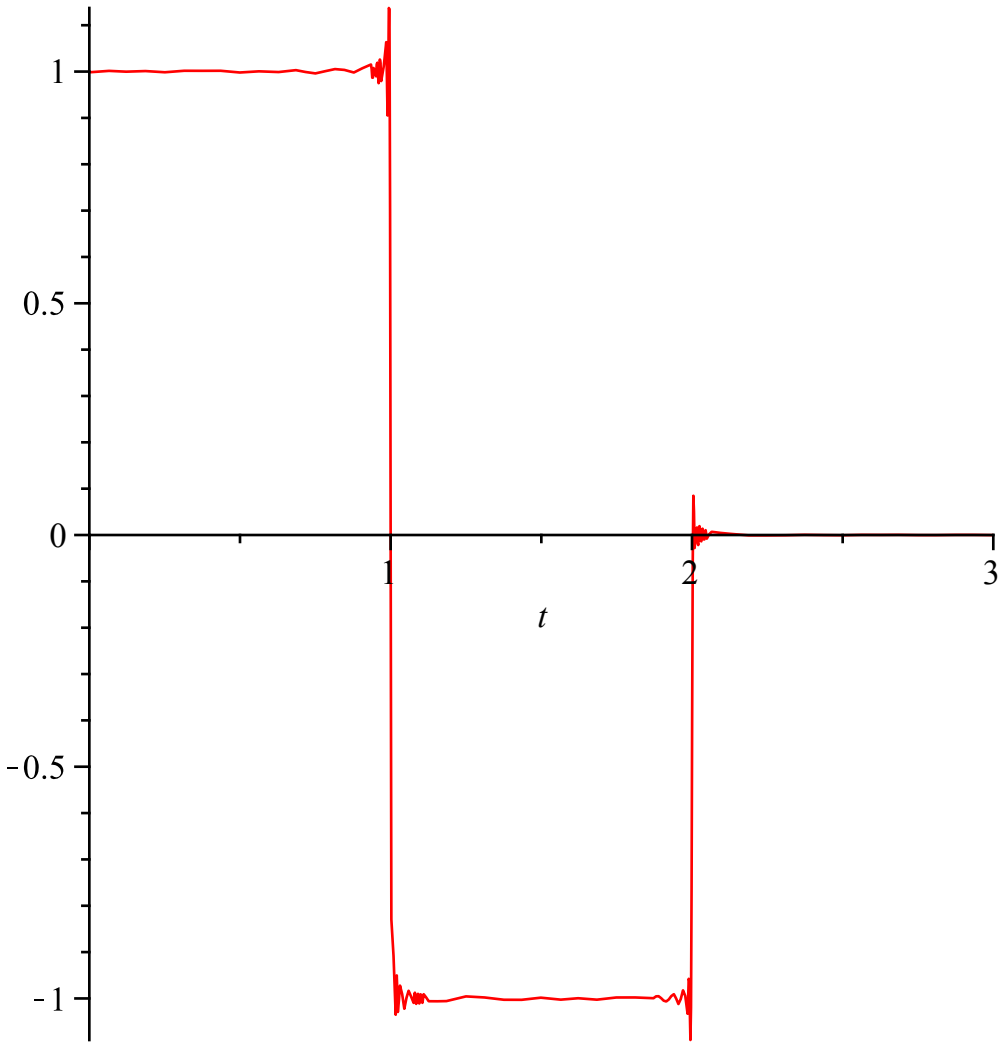
$$a_n := \frac{4 \sin\left(\frac{1}{3} n \pi\right)}{n \pi} - \frac{2 \sin\left(\frac{2}{3} n \pi\right)}{n \pi} \quad \textbf{(4)}$$

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

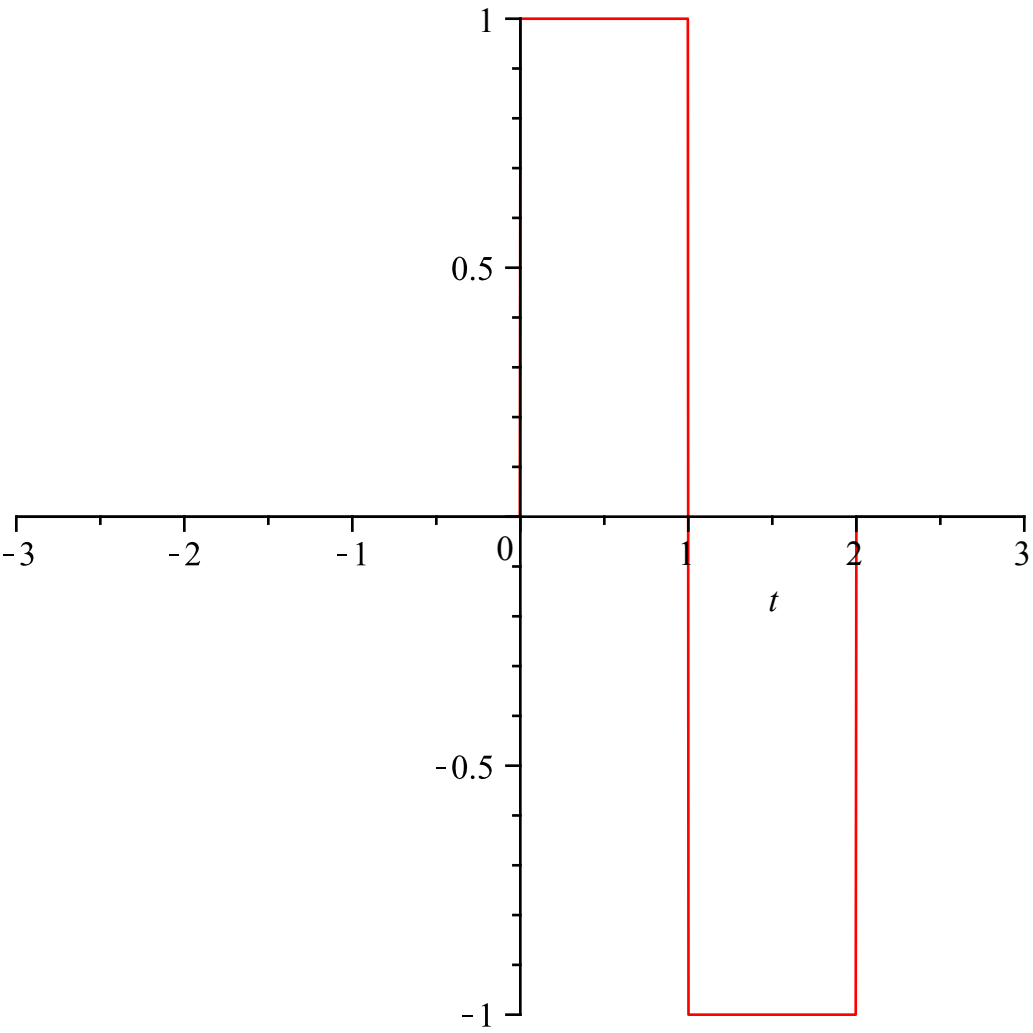
$$b_n := 0 \quad \textbf{(5)}$$

> $STF_{600} := C + sum\left(a_n \cdot \cos\left(\frac{n \cdot \mathrm{Pi} \cdot t}{L}\right), n = 1..600\right) :$

> $plot\left(STF_{600}, t = 0..3\right)$




```
> plot( f, t =-3 ..3 )
```



> $LL := \frac{(2-0)}{2}$

$$LL := 1 \tag{6}$$

> $a_0 := \left(\frac{1}{LL}\right) \cdot int(f, t = 0..2 \cdot LL)$

$$a_0 := 0 \tag{7}$$

> $a_n := simplify\left(subs\left(\sin(n \cdot \mathrm{Pi}) = 0, \left(\frac{1}{LL}\right) \cdot int\left(f \cdot \cos\left(\frac{n \cdot \mathrm{Pi} \cdot t}{LL}\right), t = 0..2 \cdot LL\right)\right)\right)$

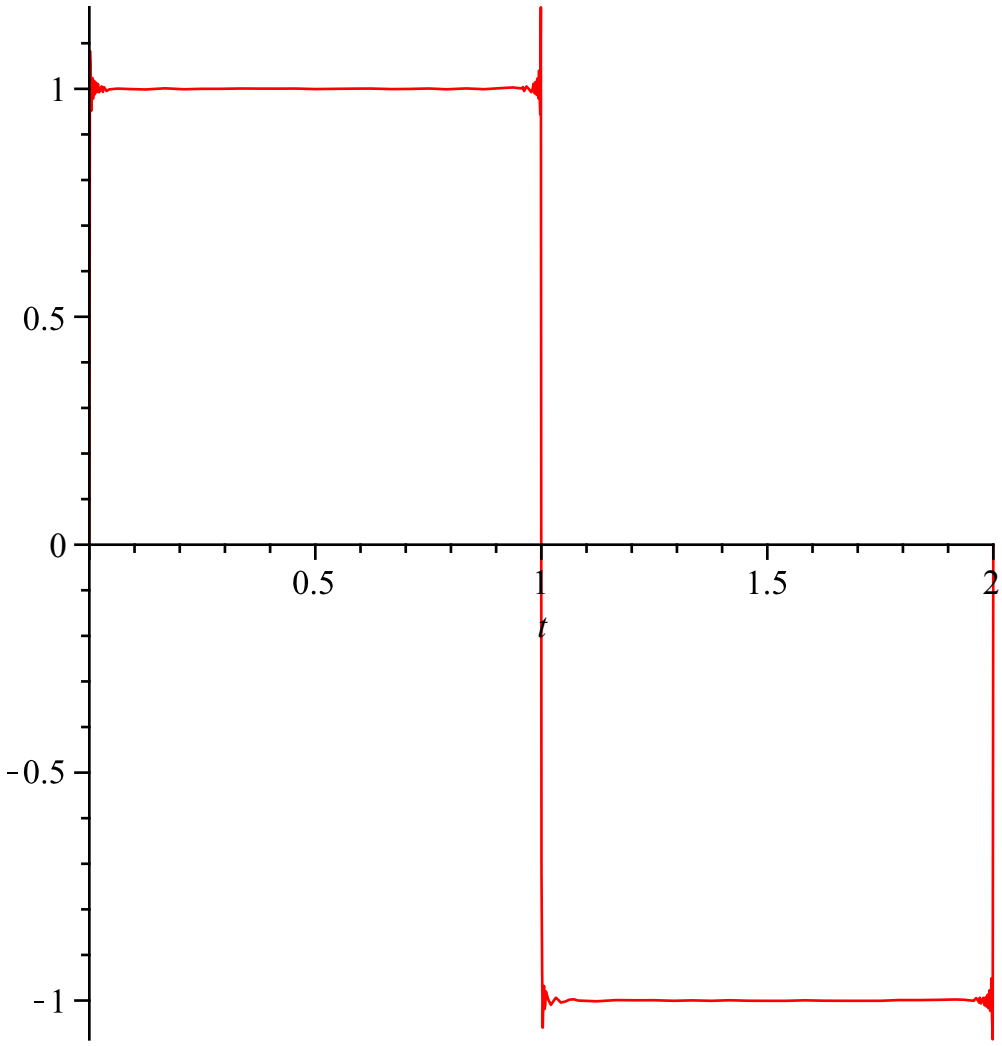
$$a_n := 0 \tag{8}$$

> $b_n := simplify\left(subs\left(\sin(n \cdot \mathrm{Pi}) = 0, \cos(n \cdot \mathrm{Pi}) = (-1)^{\cdot \cdot} n, \left(\frac{1}{LL}\right) \cdot int\left(f \cdot \sin\left(\frac{n \cdot \mathrm{Pi} \cdot t}{LL}\right), t = 0..2 \cdot LL\right)\right)\right)$

$$b_n := \frac{2\left((-1)^{2n} + (-1)^{1+n}\right)}{n\,\pi} \tag{9}$$

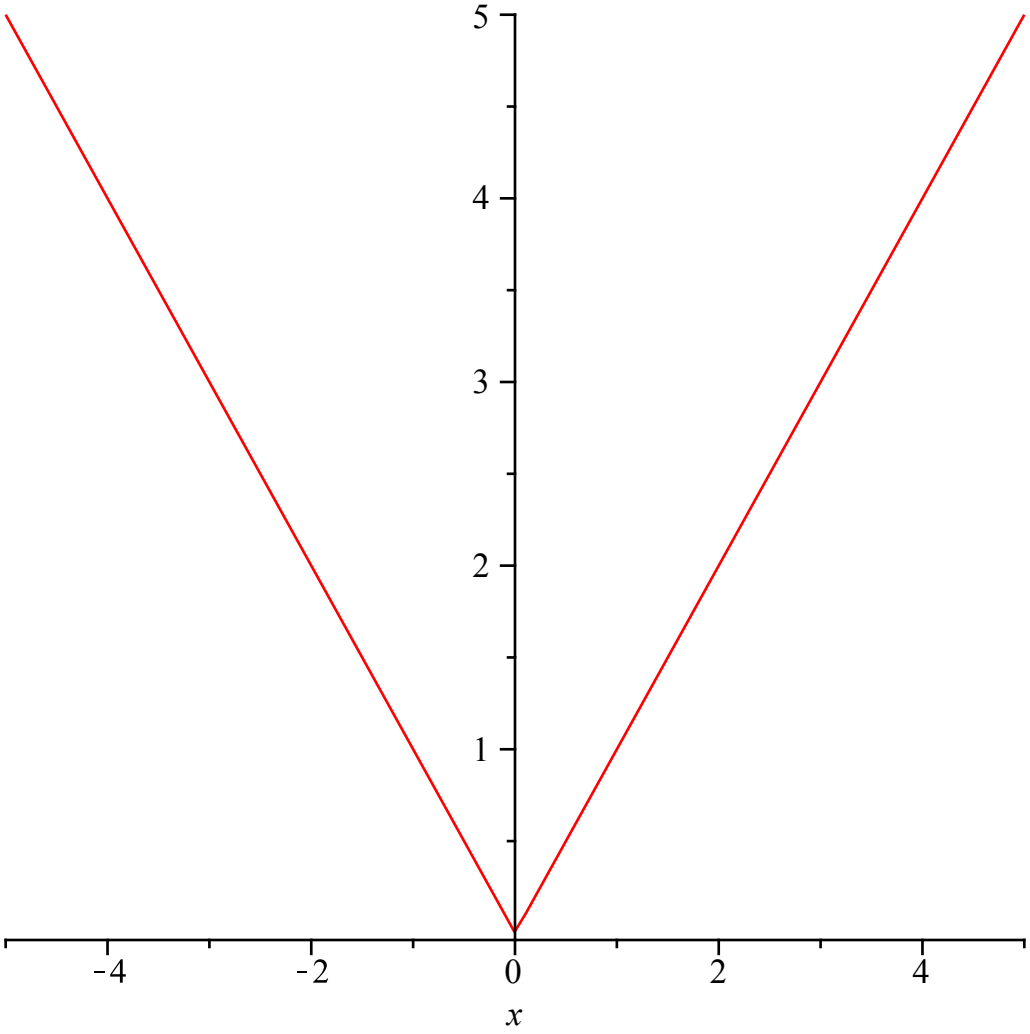
> $STF_{1000} := sum\left(b_n \cdot \sin\left(\frac{n \cdot \mathrm{Pi} \cdot t}{LL}\right), n = 1..1000\right) :$

> $plot(STF_{1000}, t = 0..2)$



> *restart*

> $f := \mathrm{abs}(x) : plot(f, x = -5..5)$



> $L := 5 : a_0 := \left(\frac{1}{L}\right) \cdot int(f, x = -L..L); C := \frac{a_0}{2}$

$$a_0 := 5$$

$$C := \frac{5}{2} \quad \textbf{(10)}$$

> $a_n := subs\left(\sin(n \cdot \mathrm{Pi}) = 0, \cos(n \cdot \mathrm{Pi}) = (-1)^{\cdot\cdot n}, \left(\frac{1}{L}\right) \cdot int\left(f \cdot \cos\left(\frac{n \cdot \mathrm{Pi} \cdot x}{L}\right), x = -L..L\right)\right)$

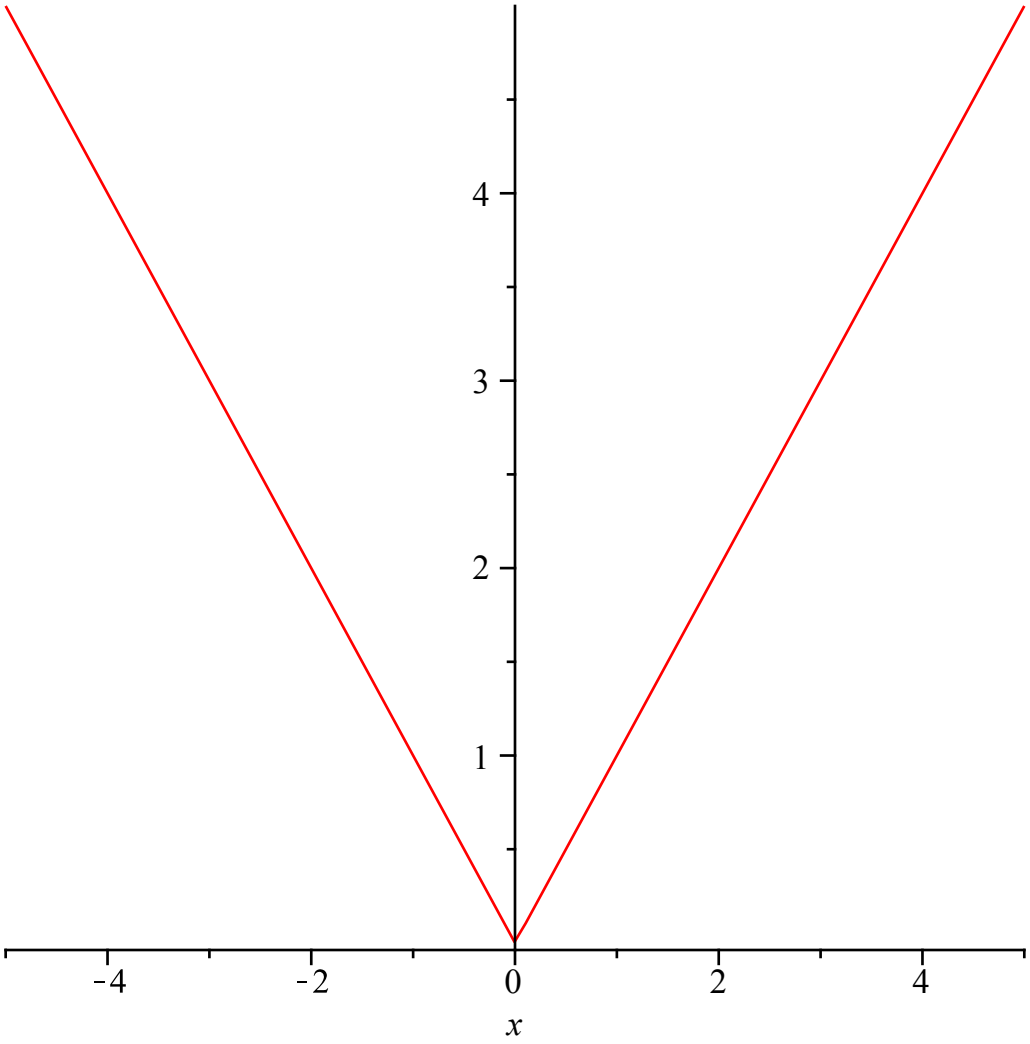
$$a_n := \frac{10\left((-1)^n - 1\right)}{n^2 \pi^2} \quad \textbf{(11)}$$

> $b_n := subs\left(\sin(n \cdot \mathrm{Pi}) = 0, \cos(n \cdot \mathrm{Pi}) = (-1)^{\cdot\cdot n}, \left(\frac{1}{L}\right) \cdot int\left(f \cdot \sin\left(\frac{n \cdot \mathrm{Pi} \cdot x}{L}\right), x = -L..L\right)\right)$

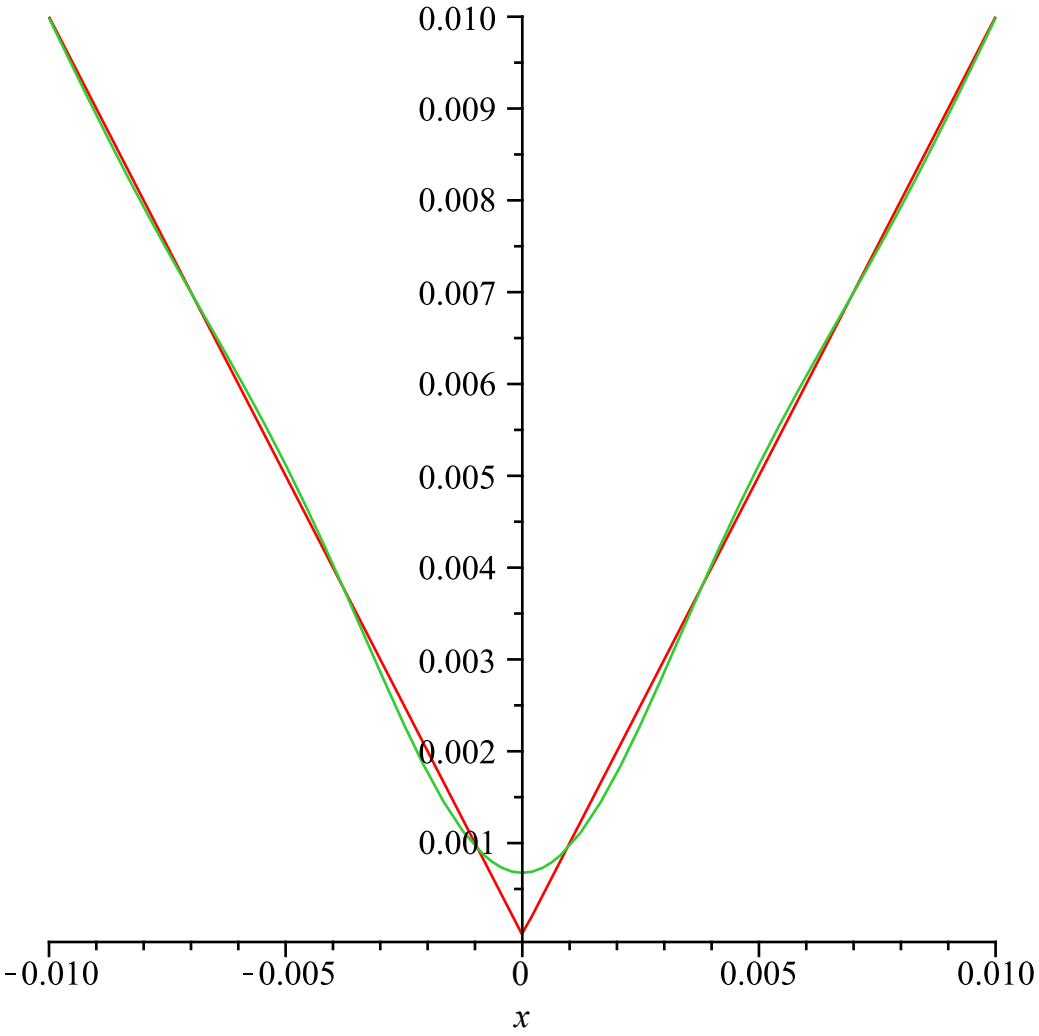
$$b_n := 0 \quad \textbf{(12)}$$

> $STF_{1500} := C + sum\left(a_n \cdot \cos\left(\frac{n \cdot \mathrm{Pi} \cdot x}{L}\right), n = 1..1500\right) :$

> $plot\left(STF_{1500}, x = -5..5\right)$



> $plot([f, STF_{1500}], x = -0.01 .. 0.01)$


0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
-0.010
-0.005
0
0.005
0.010
x