> *restart*

> $f := \text{Heaviside}(t-1) - 2 \cdot \text{Heaviside}(t-2) + \text{Heaviside}(t-3) : plot(f, t = -5 .. 5, scaling = CONSTRAINED)$
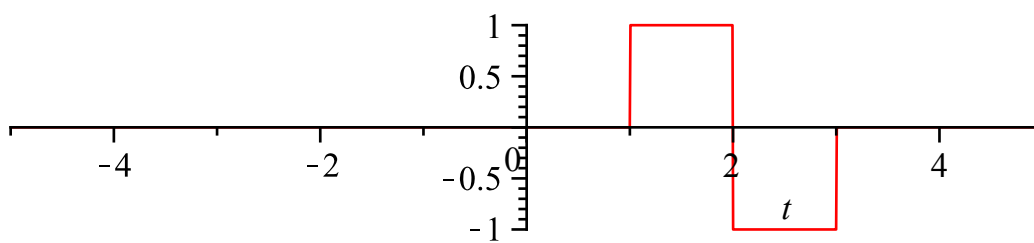
> $g := \text{Heaviside}(t+3) - 2 \cdot \text{Heaviside}(t+2) + \text{Heaviside}(t+1) : plot(g, t = -5 .. 5, scaling = CONSTRAINED)$
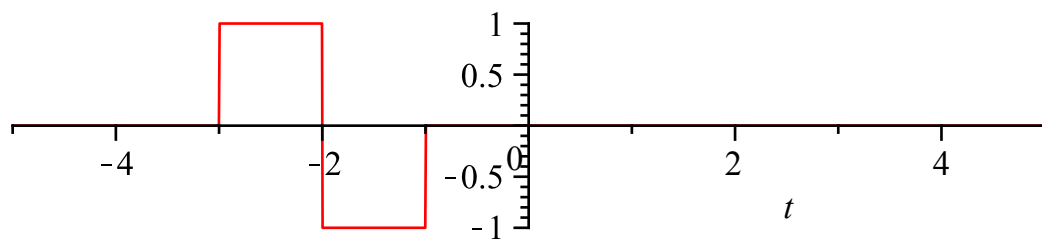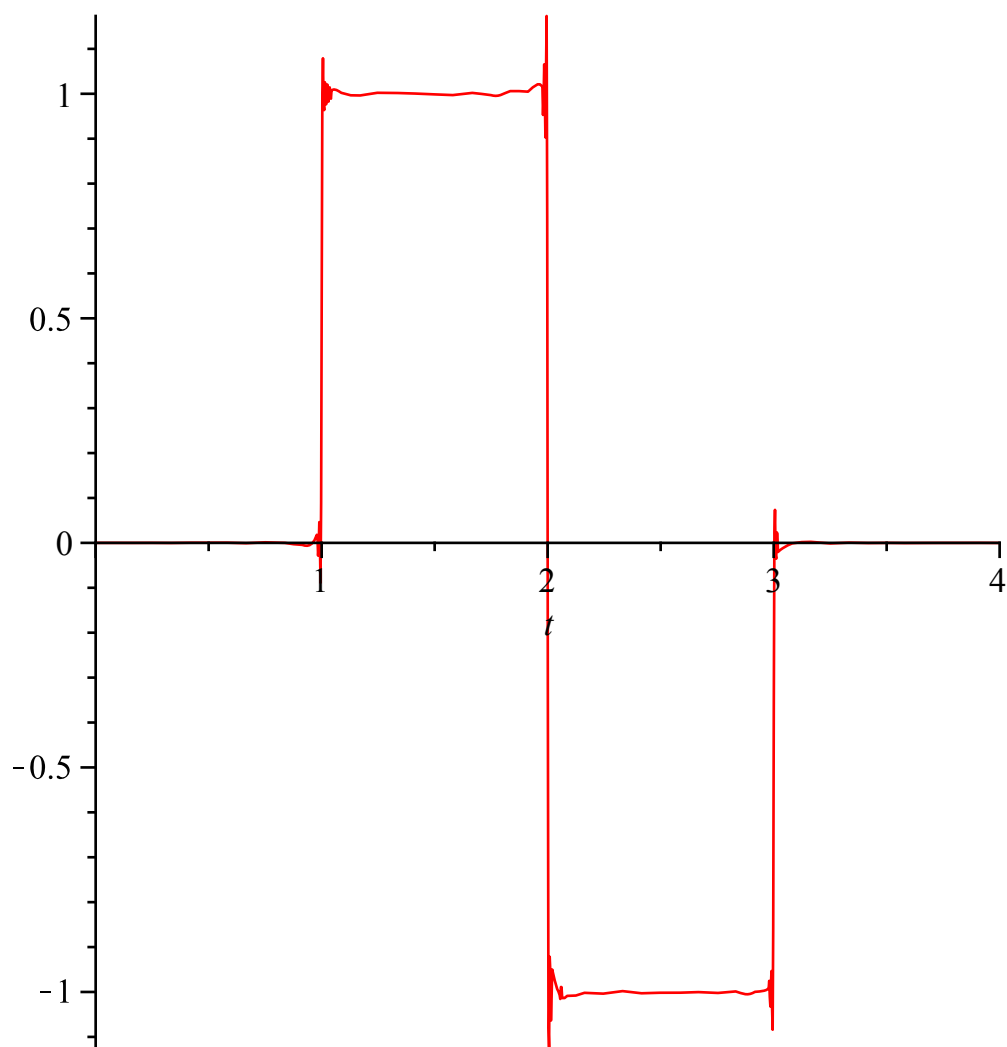
> $plot(f+g, t=-5..5, scaling=CONSTRAINED)$
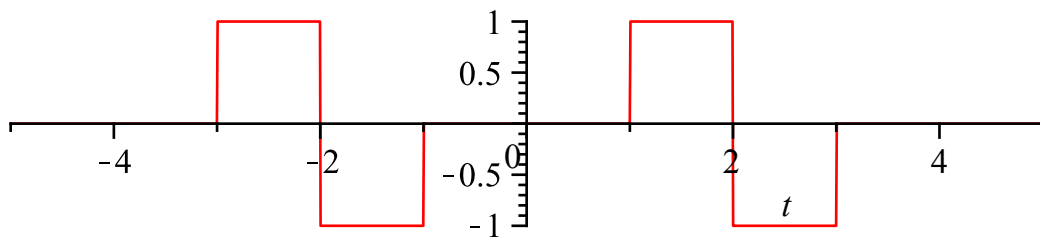
> $L := 5 : b_n := \left(\dfrac{1}{L}\right) \cdot int\left((f+g)\cdot\sin\left(\dfrac{n\cdot\text{Pi}\cdot t}{L}\right), t = -L..L\right)$

$$b_n := \frac{2\cos\left(\dfrac{1}{5}\,n\,\pi\right)}{n\,\pi} - \frac{4\cos\left(\dfrac{2}{5}\,n\,\pi\right)}{n\,\pi} + \frac{2\cos\left(\dfrac{3}{5}\,n\,\pi\right)}{n\,\pi} \tag{1}$$

> $STF_{fg} := Sum\left(b_n \cdot \sin\left(\dfrac{n\cdot\text{Pi}\cdot t}{L}\right), n = 1 .. infinity\right)$

$$STF_{fg} := \sum_{n=1}^{\infty}\left(\frac{2\cos\left(\dfrac{1}{5}\,n\,\pi\right)}{n\,\pi} - \frac{4\cos\left(\dfrac{2}{5}\,n\,\pi\right)}{n\,\pi} + \frac{2\cos\left(\dfrac{3}{5}\,n\,\pi\right)}{n\,\pi}\right)\sin\left(\dfrac{1}{5}\,n\,\pi\,t\right) \tag{2}$$

> $STF_{fg1000} := sum\left(b_n \cdot \sin\left(\dfrac{n\cdot\text{Pi}\cdot t}{L}\right), n = 1 ..1000\right) :$

> $plot\left(STF_{fg1000}, t = 0 ..4\right)$

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

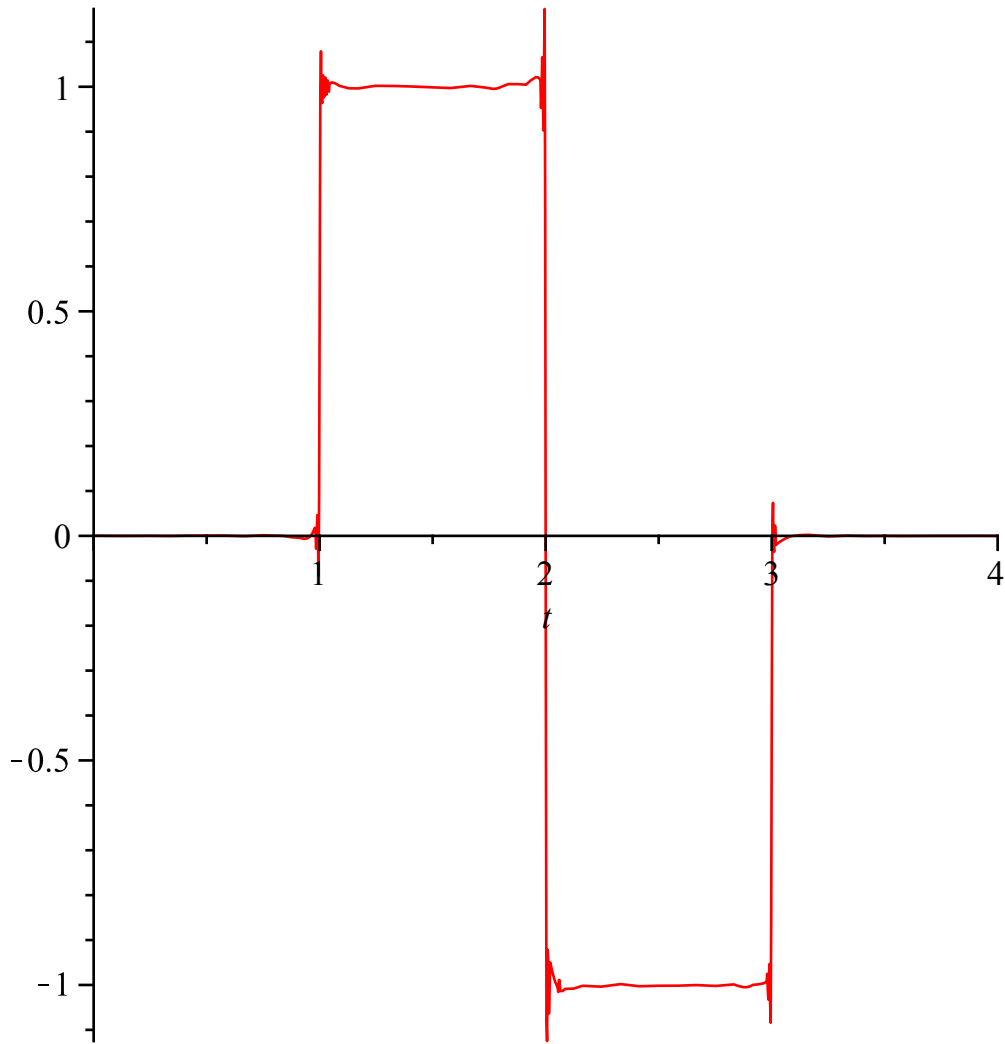> $a_0 := \left(\dfrac{1}{L}\right) \cdot int((f+h), t=-L..L)$

$$a_0 := 0 \qquad\qquad (3)$$
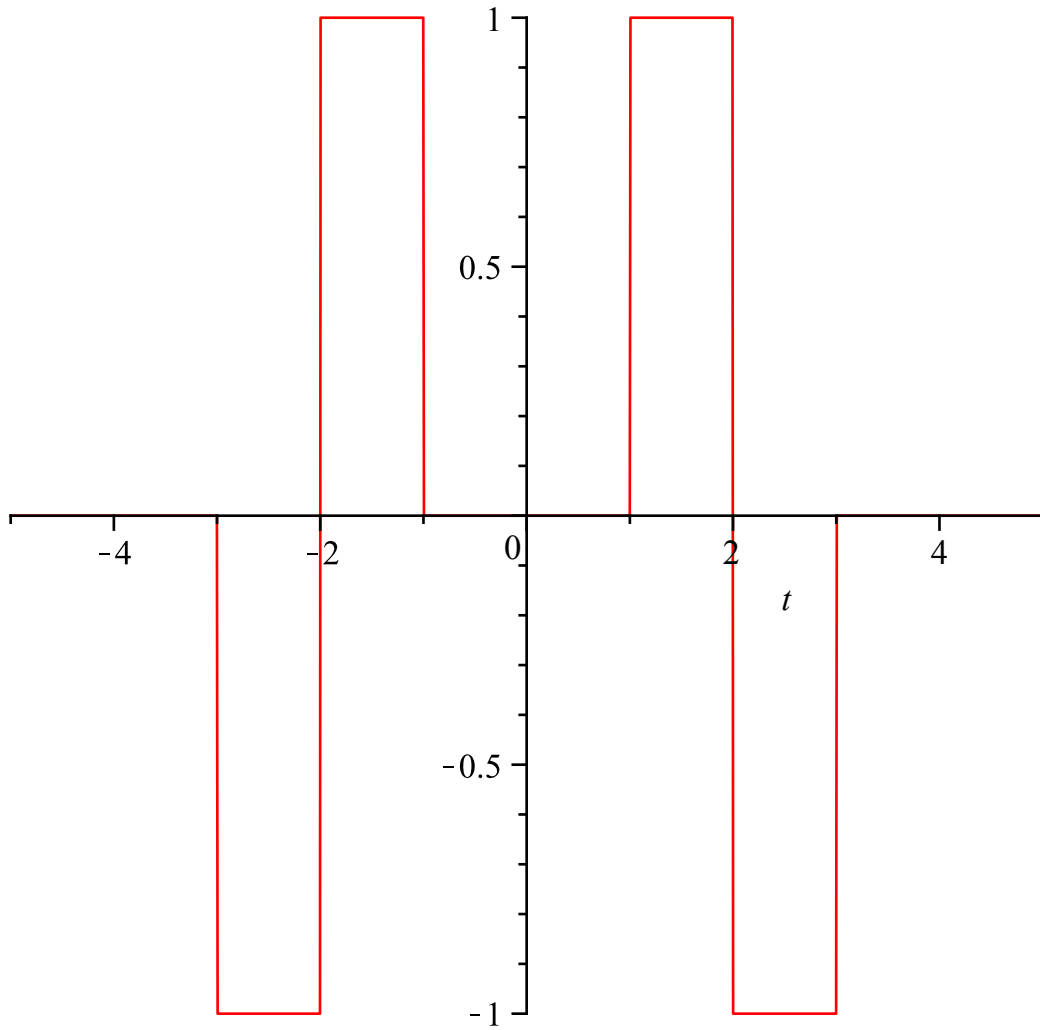
> $a_n := \left(\dfrac{1}{L}\right) \cdot int\left((f+h) \cdot \cos\left(\dfrac{n \cdot Pi \cdot t}{L}\right), t=-L..L\right)$

$$a_n := -\frac{2 \sin\left(\frac{1}{5} n \pi\right)}{n \pi} + \frac{4 \sin\left(\frac{2}{5} n \pi\right)}{n \pi} - \frac{2 \sin\left(\frac{3}{5} n \pi\right)}{n \pi} \qquad\qquad (4)$$

> $STF_{fh} := Sum\left(a_n \cdot \cos\left(\dfrac{n \cdot Pi \cdot t}{L}\right), n = 1 .. infinity\right)$

$$STF_{fh} := \sum_{n=1}^{\infty} \left(-\frac{2 \sin\left(\frac{1}{5} n \pi\right)}{n \pi} + \frac{4 \sin\left(\frac{2}{5} n \pi\right)}{n \pi} - \frac{2 \sin\left(\frac{3}{5} n \pi\right)}{n \pi} \right) \cos\left(\frac{1}{5} n \pi t\right) \qquad (5)$$

> $STF_{fh1000} := sum\left(a_n \cdot \cos\left(\dfrac{n \cdot Pi \cdot t}{L}\right), n = 1 .. 1000\right):$

> $plot\left(STF_{fh1000}, t=0..4\right)$

> $L := \dfrac{5}{2} : a_0 := \left(\dfrac{1}{L}\right) \cdot int(f, t = 0 .. 2 \cdot L)$

$$a_0 := 0 \tag{6}$$

> $a_n := \left(\dfrac{1}{L}\right) \cdot int\left(f \cdot \cos\left(\dfrac{n \cdot \mathrm{Pi} \cdot t}{L}\right), t = 0 .. 2 \cdot L\right)$

$$a_n := -\frac{\sin\left(\dfrac{2}{5}\, n\, \pi\right)}{n\, \pi} + \frac{2 \sin\left(\dfrac{4}{5}\, n\, \pi\right)}{n\, \pi} - \frac{\sin\left(\dfrac{6}{5}\, n\, \pi\right)}{n\, \pi} \tag{7}$$

> $b_n := \left(\dfrac{1}{L}\right) \cdot int\left(f \cdot \sin\left(\dfrac{n \cdot \mathrm{Pi} \cdot t}{L}\right), t = 0 .. 2 \cdot L\right)$

$$b_n := \frac{\cos\left(\dfrac{2}{5}\, n\, \pi\right)}{n\, \pi} - \frac{2 \cos\left(\dfrac{4}{5}\, n\, \pi\right)}{n\, \pi} + \frac{\cos\left(\dfrac{6}{5}\, n\, \pi\right)}{n\, \pi} \tag{8}$$

> $STF := Sum\left(a_n \cdot \cos\left(\dfrac{n \cdot \mathrm{Pi} \cdot t}{L}\right) + b_n \cdot \sin\left(\dfrac{n \cdot \mathrm{Pi} \cdot t}{L}\right), n = 1 .. infinity\right)$

$$\tag{9}$$

$$STF := \sum_{n=1}^{\infty} \left(\left(-\frac{\sin\left(\frac{2}{5} n \pi\right)}{n \pi} + \frac{2 \sin\left(\frac{4}{5} n \pi\right)}{n \pi} - \frac{\sin\left(\frac{6}{5} n \pi\right)}{n \pi} \right) \cos\left(\frac{2}{5} n \pi t\right) \right.$$
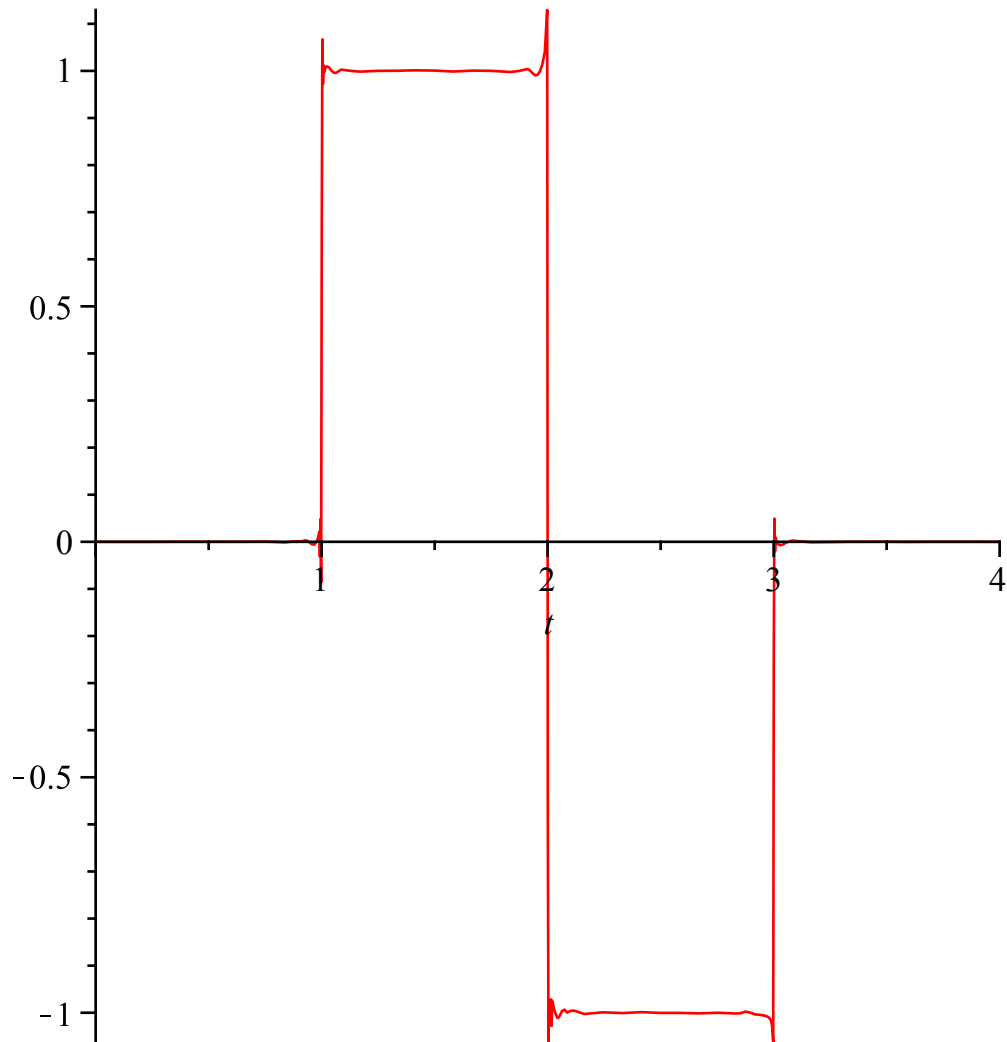
$$\left. + \left(\frac{\cos\left(\frac{2}{5} n \pi\right)}{n \pi} - \frac{2 \cos\left(\frac{4}{5} n \pi\right)}{n \pi} + \frac{\cos\left(\frac{6}{5} n \pi\right)}{n \pi} \right) \sin\left(\frac{2}{5} n \pi t\right) \right)$$

(9)

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

> $plot\left(STF_{1000}, t = 0 .. 4 \right)$

>
>