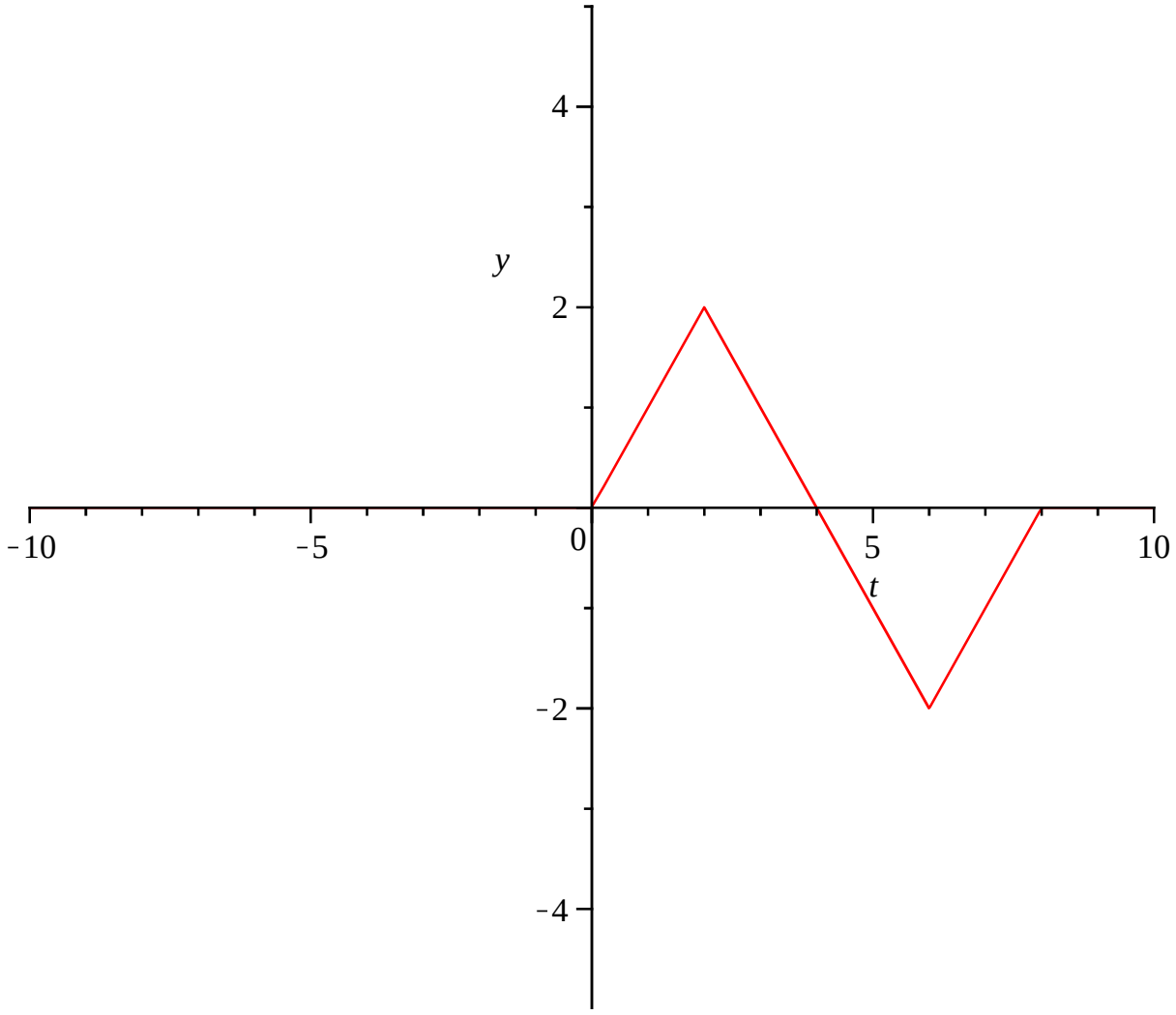
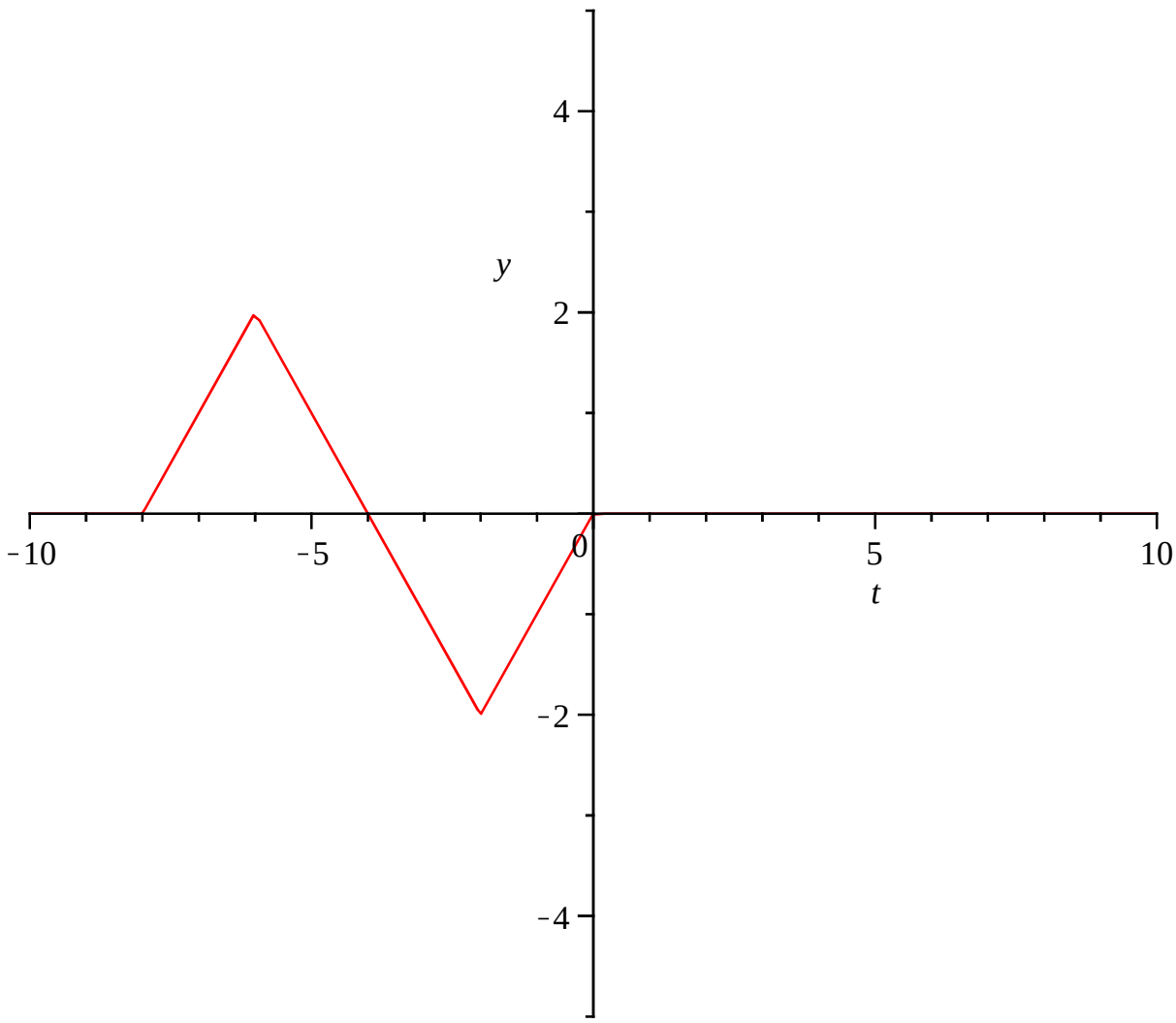
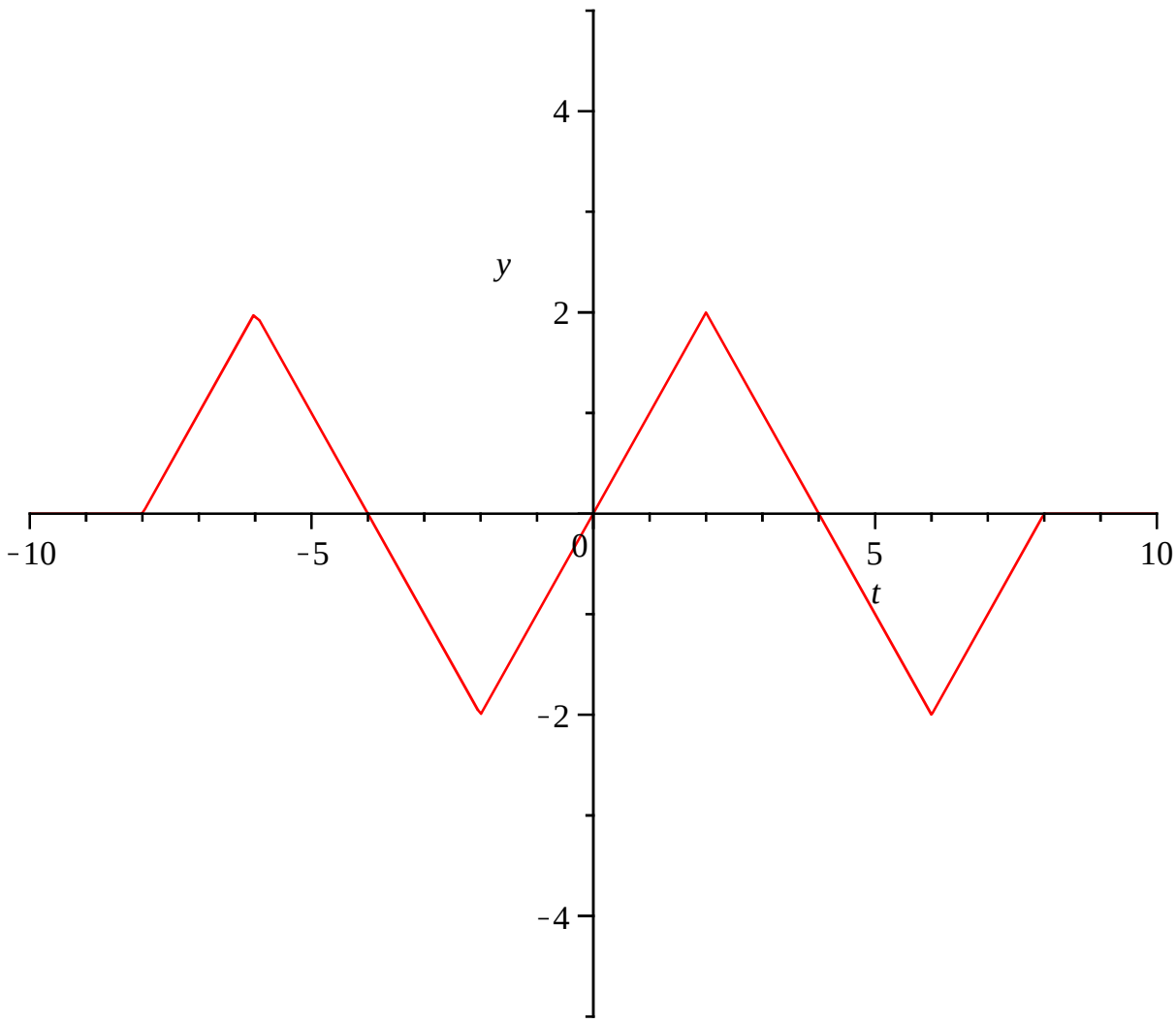
```
> restart
> f := t·Heaviside(t) − 2·(t − 2)·Heaviside(t − 2) + 2·(t − 6)·Heaviside(t − 6) − (t − 8)
      ·Heaviside(t − 8) : plot( f, t = −10 ..10, y = −5 ..5)
```




```
> g := (t + 8)·Heaviside(t + 8) −2·(t + 6)·Heaviside(t + 6) + 2·(t + 2)·Heaviside(t + 2) − t
      ·Heaviside(t) : plot(g, t = −10 ..10, y = −5 ..5)
```



> $h := f + g : plot(h, t = -10..10, y = -5..5)$



> $L := 9$

$$L := 9 \quad \textbf{(1)}$$

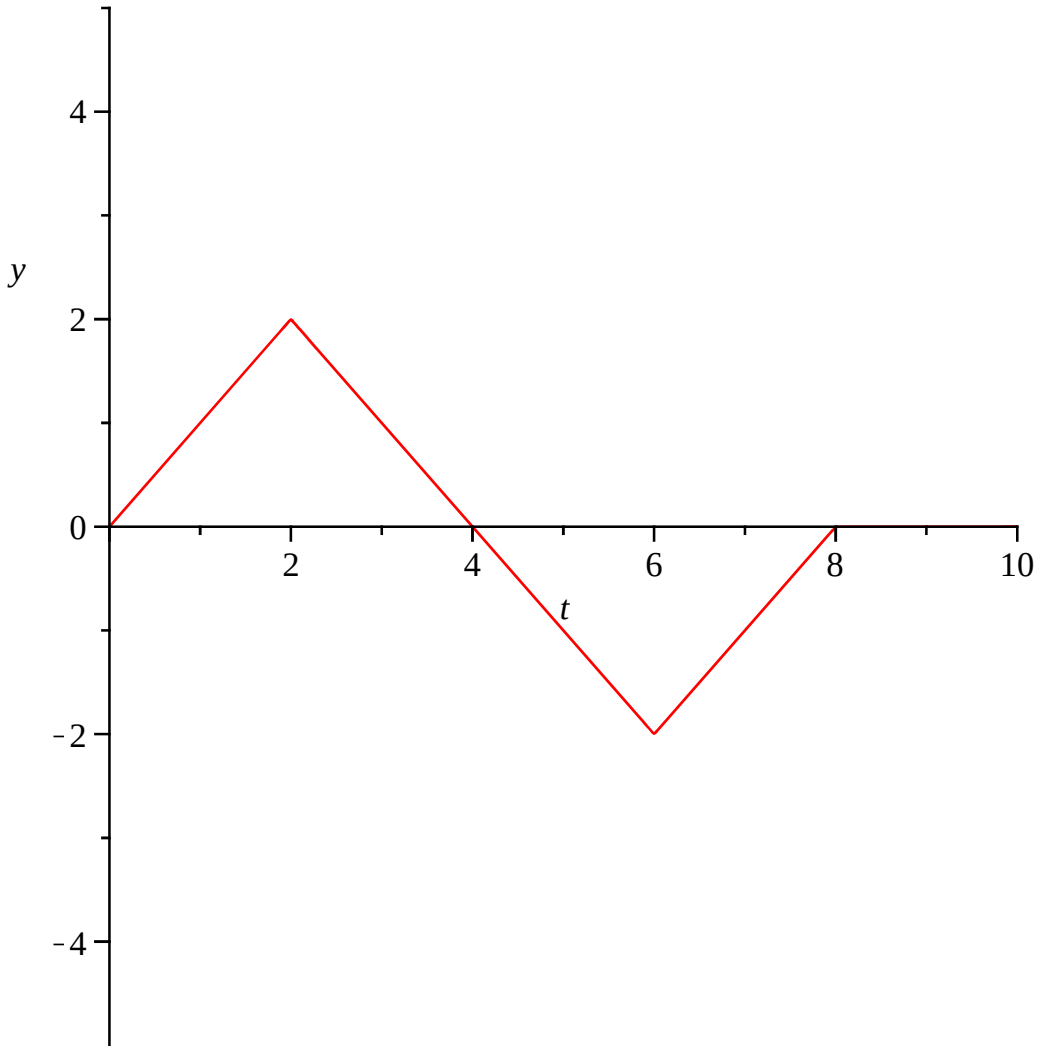
> $b_n := \frac{1}{L} \cdot int\left(h \cdot \sin\left(\frac{n \cdot \mathrm{Pi}}{L} \cdot t\right), t = -L..L\right) :$

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

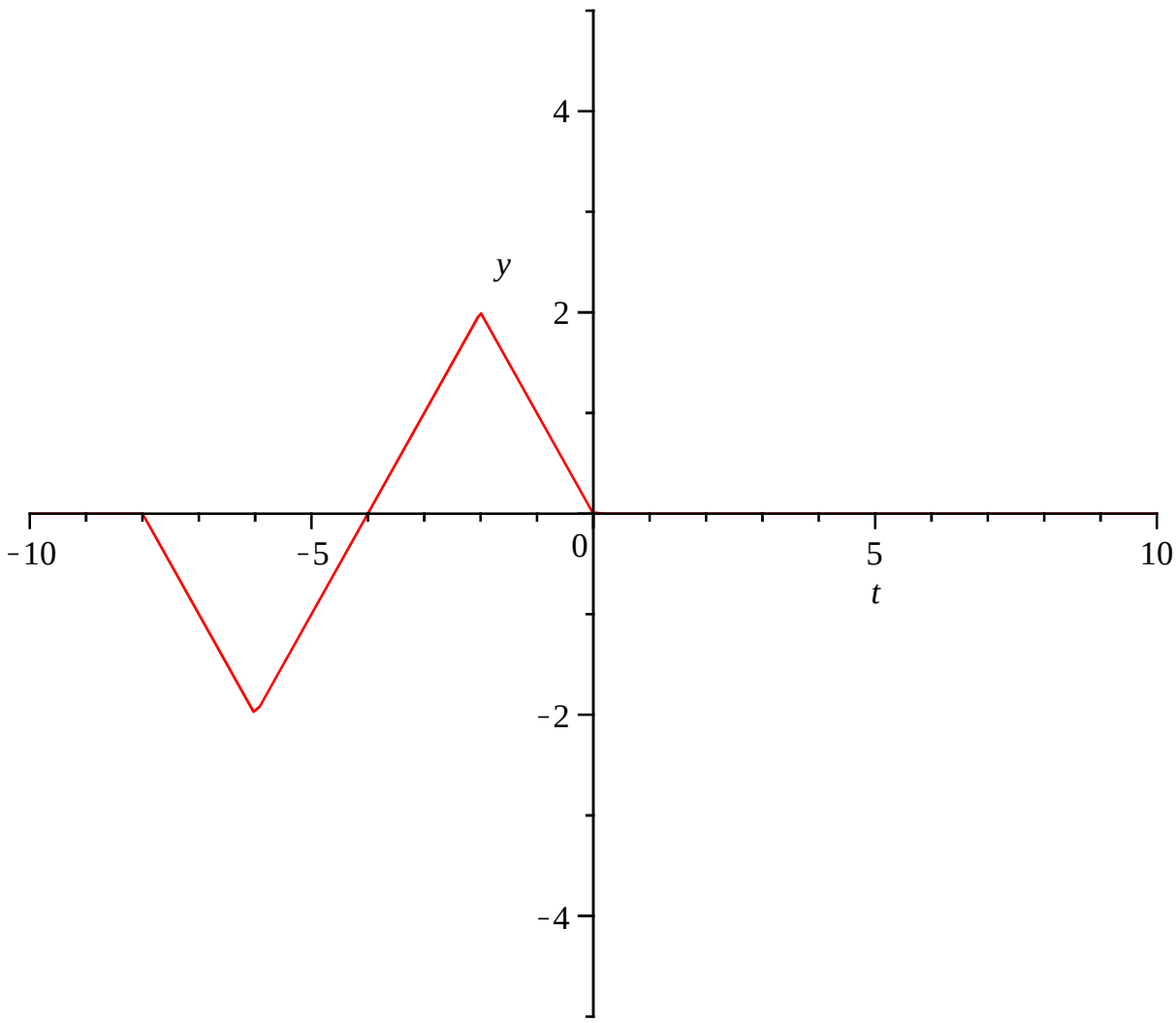
$$STF_{completa} := \sum_{n=1}^{\infty} \frac{1}{4} \frac{\left(32 \sin(n\,\pi) \cos(n\,\pi) + 32 \sin\left(\frac{1}{2} n\,\pi\right) - 32 \sin\left(\frac{3}{2} n\,\pi\right)\right) \sin\left(\frac{1}{9} n\,\pi\,t\right)}{n^2\,\pi^2} \quad \textbf{(2)}$$

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

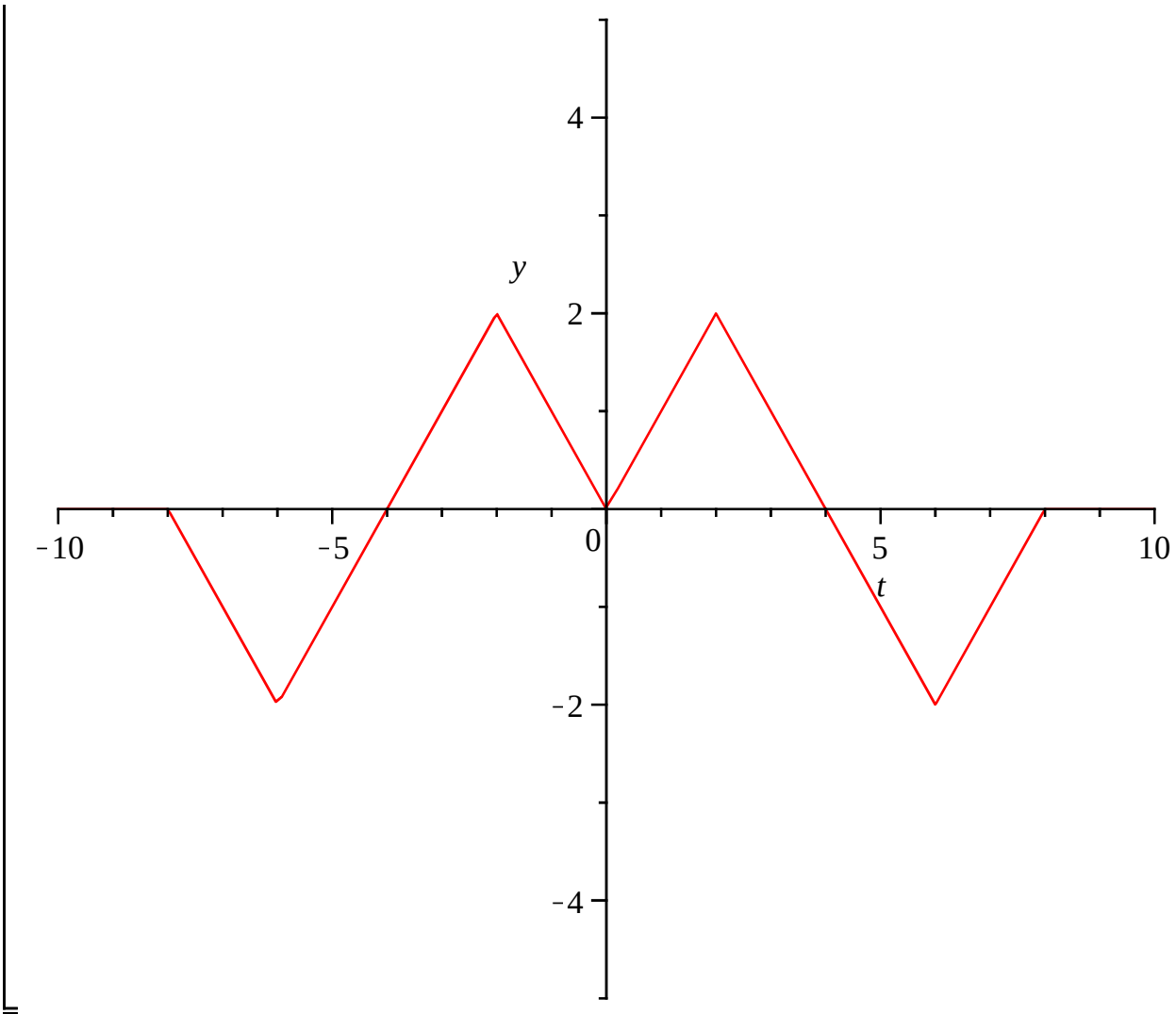
> $plot\left(STF_{500}, t = 0..10, y = -5..5\right)$




```
> k := -(t+8)·Heaviside(t+8) + 2·(t+6)·Heaviside(t+6) - 2·(t+2)·Heaviside(t+2)
      + t·Heaviside(t) : plot(k, t = -10..10, y = -5..5)
```



> $l := f + k : plot(l, t = -10..10, y = -5..5)$



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

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

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

$$a_n := \frac{36\left(\cos\left(\frac{2}{9} n\pi\right) + \frac{2}{9}\sin\left(\frac{2}{9} n\pi\right) n\pi\right)}{n^2\pi^2} + \frac{18\left(\cos\left(\frac{8}{9} n\pi\right) + \frac{8}{9}\sin\left(\frac{8}{9} n\pi\right) n\pi\right)}{n^2\pi^2} - \frac{16\sin\left(\frac{8}{9} n\pi\right)}{n\pi} - \frac{18}{n^2\pi^2} - \frac{8\sin\left(\frac{2}{9} n\pi\right)}{n\pi} - \frac{36\left(\cos\left(\frac{2}{3} n\pi\right) + \frac{2}{3}\sin\left(\frac{2}{3} n\pi\right) n\pi\right)}{n^2\pi^2} + \frac{24\sin\left(\frac{2}{3} n\pi\right)}{n\pi} \quad \textbf{(4)}$$

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

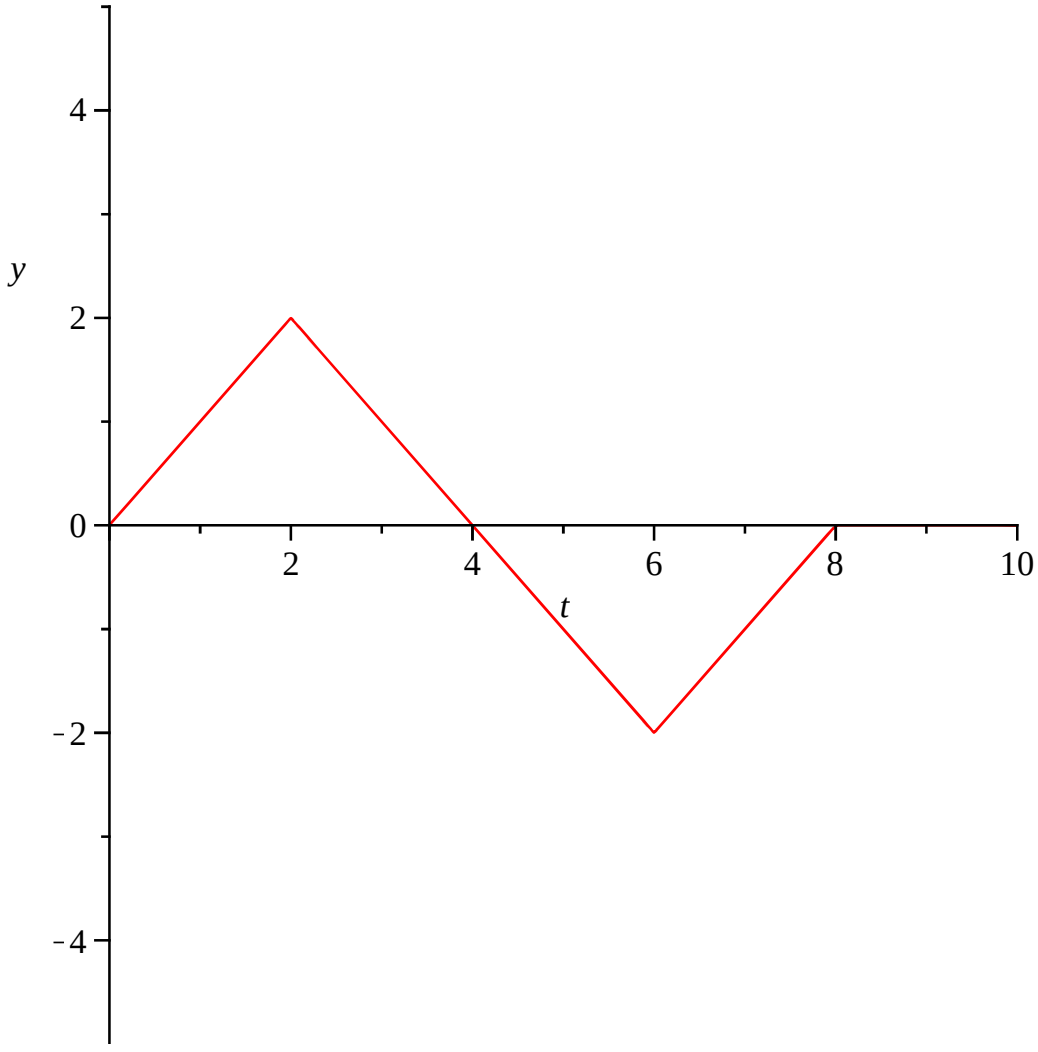
$$b_n := 0 \quad \textbf{(5)}$$

> $SSTF_{completa} := Sum\left(a_n \cdot \cos\left(\frac{n \cdot \mathrm{Pi}}{L} \cdot t\right), n = 1 \,..\, infinity\right)$

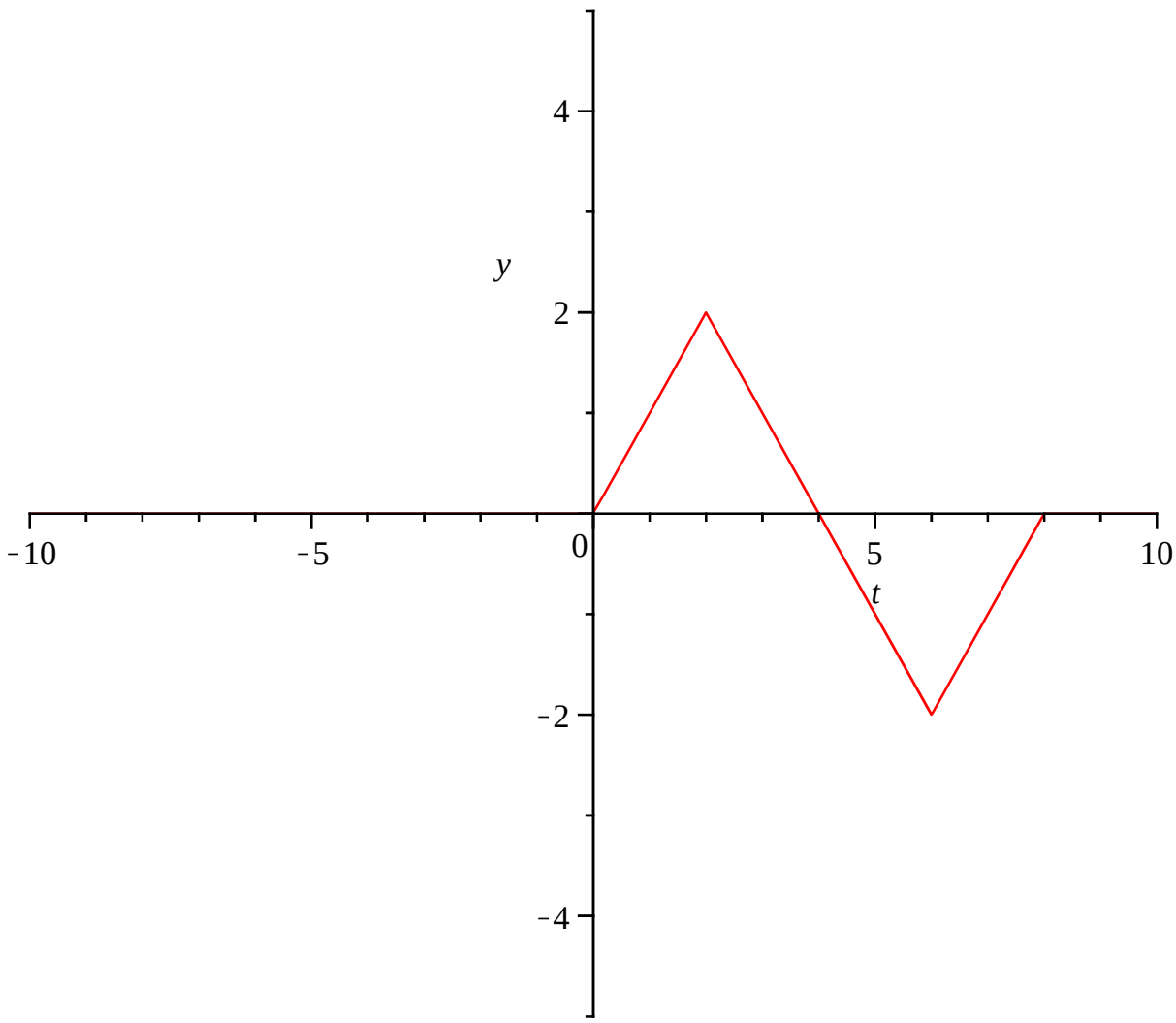
$$SSTF_{completa} := \sum_{n=1}^{\infty} \frac{1}{4} \frac{\left(32\cos(n\,\pi)^2 - 32 - 32\cos\left(\frac{3}{2}\,n\,\pi\right) + 32\cos\left(\frac{1}{2}\,n\,\pi\right)\right)\cos\left(\frac{1}{9}\,n\,\pi\,t\right)}{n^2\,\pi^2} \tag{6}$$

> $SSTF_{500} := sum\left(a_n \cdot \cos\left(\frac{n \cdot \mathrm{Pi}}{L} \cdot t\right), n = 1 \,..\, 500\right) :$

> $plot(SSTF_{500}, t = 0 \,..\, 10, y = -5 \,..\, 5)$



> $f := t \cdot \mathrm{Heaviside}(t) - 2 \cdot (t-2) \cdot \mathrm{Heaviside}(t-2) + 2 \cdot (t-6) \cdot \mathrm{Heaviside}(t-6) - (t-8)$
$\cdot \mathrm{Heaviside}(t-8) : plot(f, t = -10 \,..\, 10, y = -5 \,..\, 5)$



> $LL := 4$

$$LL := 4 \quad (7)$$

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

$$a_0 := 0 \quad (8)$$

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

$$a_n := \frac{1}{4} \, \frac{32\cos(n\pi)^2 - 32 - 32\cos\left(\frac{3}{2} n\pi\right) + 32\cos\left(\frac{1}{2} n\pi\right)}{n^2 \pi^2} \quad (9)$$

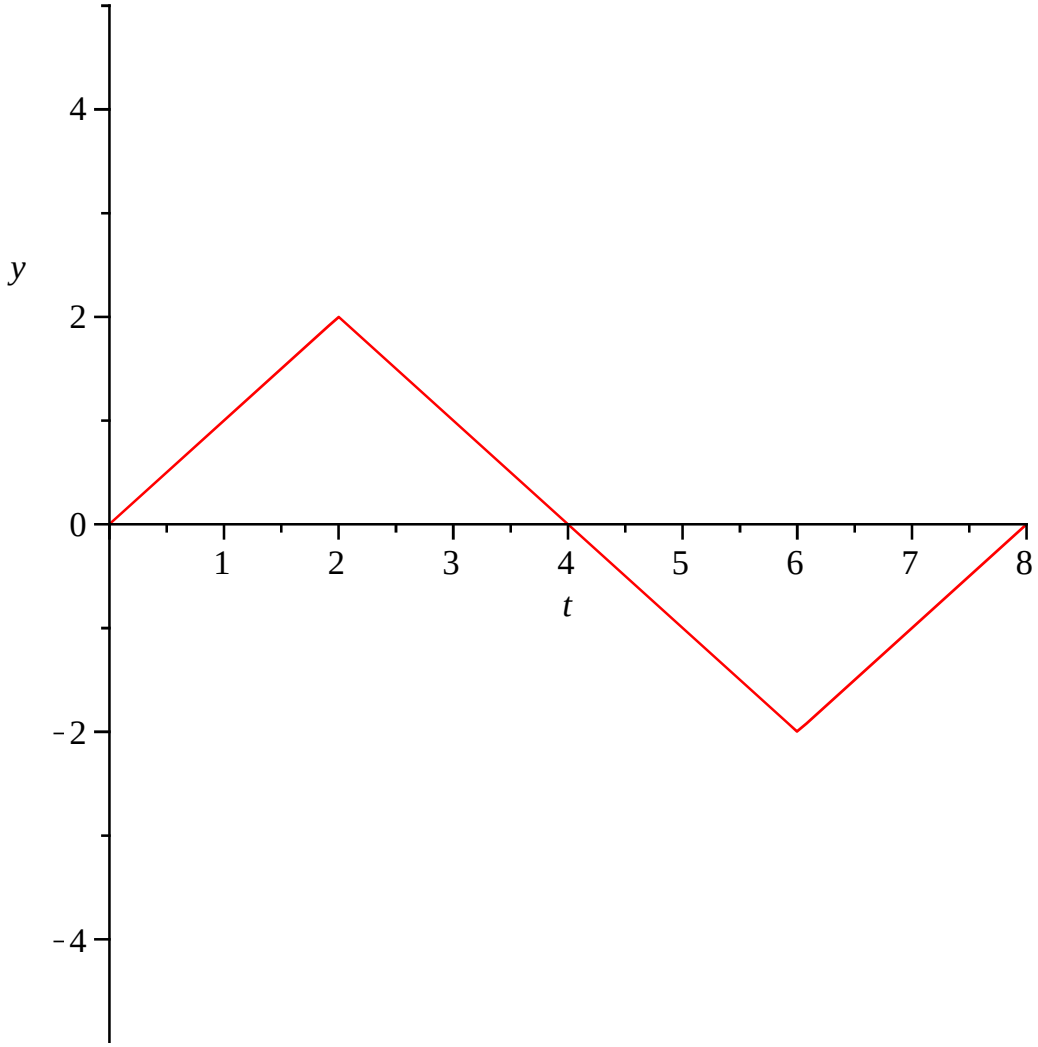
> $b_n := \frac{1}{LL} \cdot int\left(f \cdot \sin\left(\frac{n \cdot \mathrm{Pi}}{LL} \cdot t\right), t = 0..2 \cdot LL\right)$

$$b_n := \frac{1}{4} \, \frac{32\sin(n\pi)\cos(n\pi) + 32\sin\left(\frac{1}{2} n\pi\right) - 32\sin\left(\frac{3}{2} n\pi\right)}{n^2 \pi^2} \quad (10)$$

> $SSSTF_{completa} := Sum\left(a_n \cdot \cos\left(\frac{n \cdot \mathrm{Pi}}{LL} \cdot t\right) + b_n \cdot \sin\left(\frac{n \cdot \mathrm{Pi}}{LL} \cdot t\right), n = 1..infinity\right)$

$$SSSTF_{completa} := \sum_{n=1}^{\infty} \left(\frac{1}{4} \frac{\left(32\cos(n\pi)^2 - 32 - 32\cos\left(\frac{3}{2}n\pi\right) + 32\cos\left(\frac{1}{2}n\pi\right)\right)\cos\left(\frac{1}{4}n\pi t\right)}{n^2\pi^2} + \frac{1}{4}\frac{\left(32\sin(n\pi)\cos(n\pi) + 32\sin\left(\frac{1}{2}n\pi\right) - 32\sin\left(\frac{3}{2}n\pi\right)\right)\sin\left(\frac{1}{4}n\pi t\right)}{n^2\pi^2} \right) \quad \textbf{(11)}$$

```
> SSSTF500 := sum(a_n·cos((n·Pi/LL)·t) + b_n·sin((n·Pi/LL)·t), n = 1..500):
> plot(SSSTF500, t = 0..8, y = -5..5)
```

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