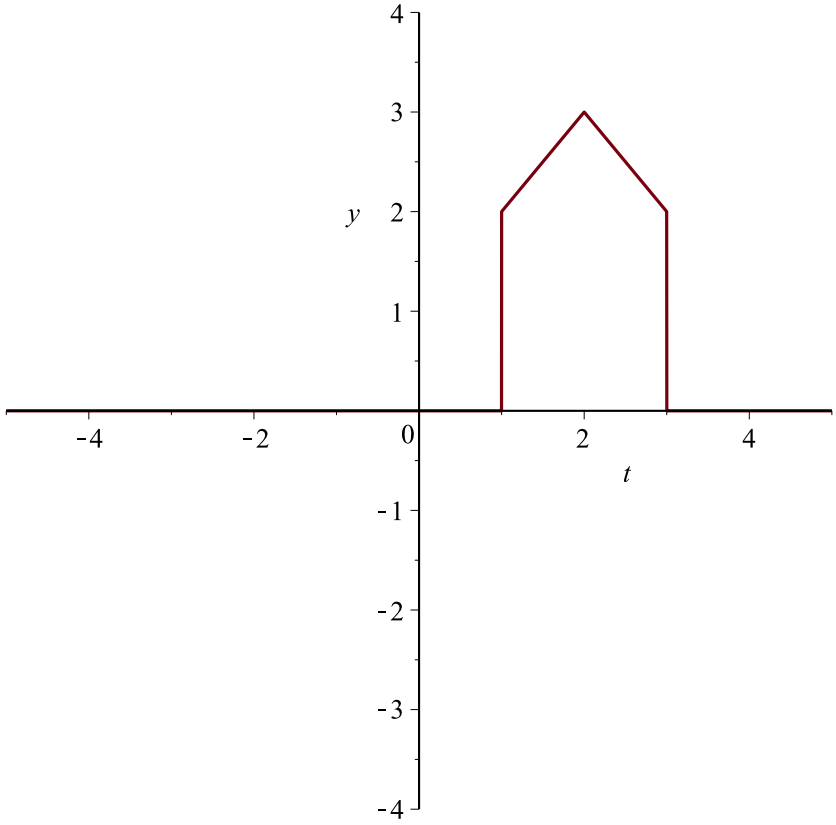
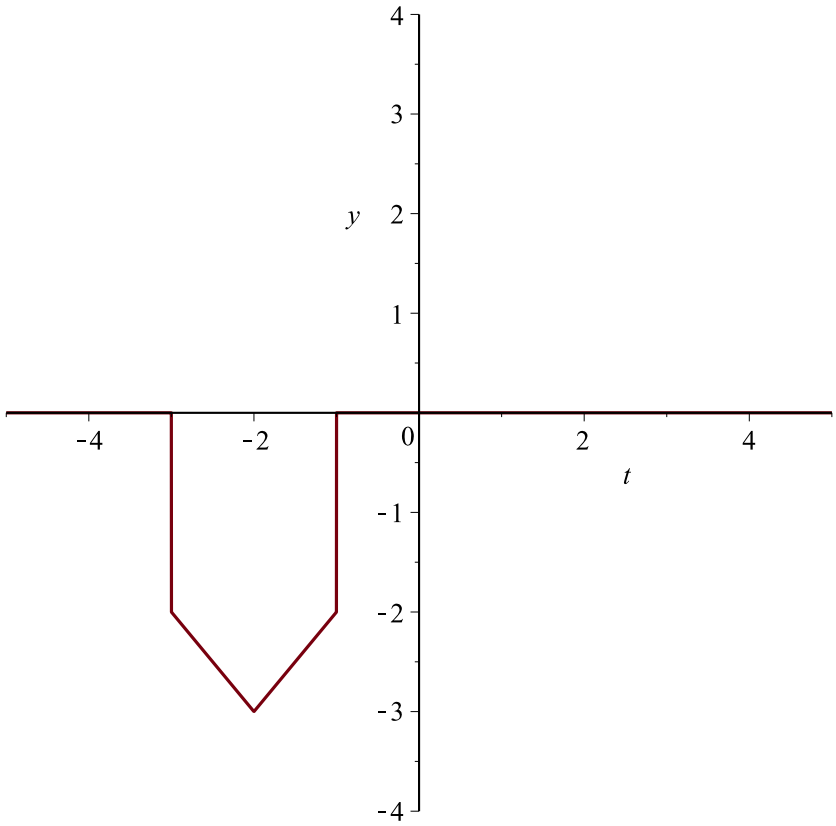
```
> restart
> f := 2·Heaviside(t − 1) + (t − 1)·Heaviside(t − 1) − 2·(t − 2)·Heaviside(t − 2) + (t − 3)
      ·Heaviside(t − 3) − 2·Heaviside(t − 3); plot(f, t = −5..5, y = −4..4)
```

$$f := 2\,\text{Heaviside}(t-1) + (t-1)\,\text{Heaviside}(t-1) - 2\,(t-2)\,\text{Heaviside}(t-2) + (t-3)\,\text{Heaviside}(t-3) - 2\,\text{Heaviside}(t-3)$$



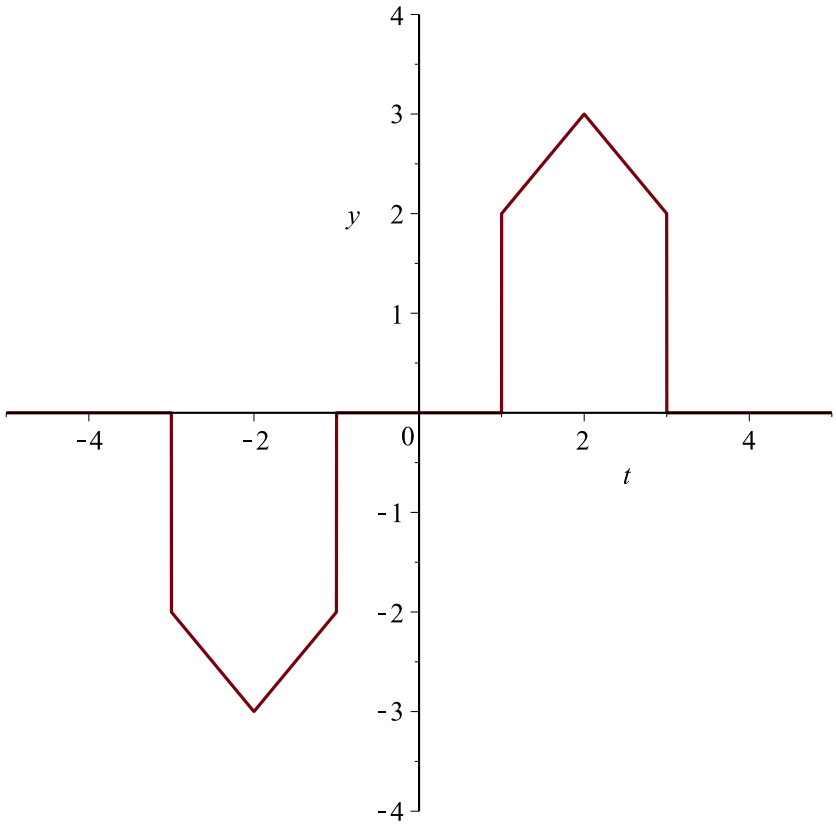

```
> g := −2·Heaviside(t + 3) − (t + 3)·Heaviside(t + 3) + 2·(t + 2)·Heaviside(t + 2) − (t + 1)
      ·Heaviside(t + 1) + 2·Heaviside(t + 1); plot(g, t = −5..5, y = −4..4)
```

$$g := -2\,\text{Heaviside}(t+3) - (t+3)\,\text{Heaviside}(t+3) + 2\,(t+2)\,\text{Heaviside}(t+2) - (t+1)\,\text{Heaviside}(t+1) + 2\,\text{Heaviside}(t+1)$$



> $h := g + f; plot(h, t = -5..5, y = -4..4)$

$$h := -2\,\text{Heaviside}(t+3) - (t+3)\,\text{Heaviside}(t+3) + 2\,(t+2)\,\text{Heaviside}(t+2) - (t+1)\,\text{Heaviside}(t+1) + 2\,\text{Heaviside}(t+1) + 2\,\text{Heaviside}(t-1) + (t-1)\,\text{Heaviside}(t-1) - 2\,(t-2)\,\text{Heaviside}(t-2) + (t-3)\,\text{Heaviside}(t-3) - 2\,\text{Heaviside}(t-3)$$



> $L := 4$

$$L := 4 \quad \textbf{(1)}$$

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

$$a_0 := 0 \quad \textbf{(2)}$$

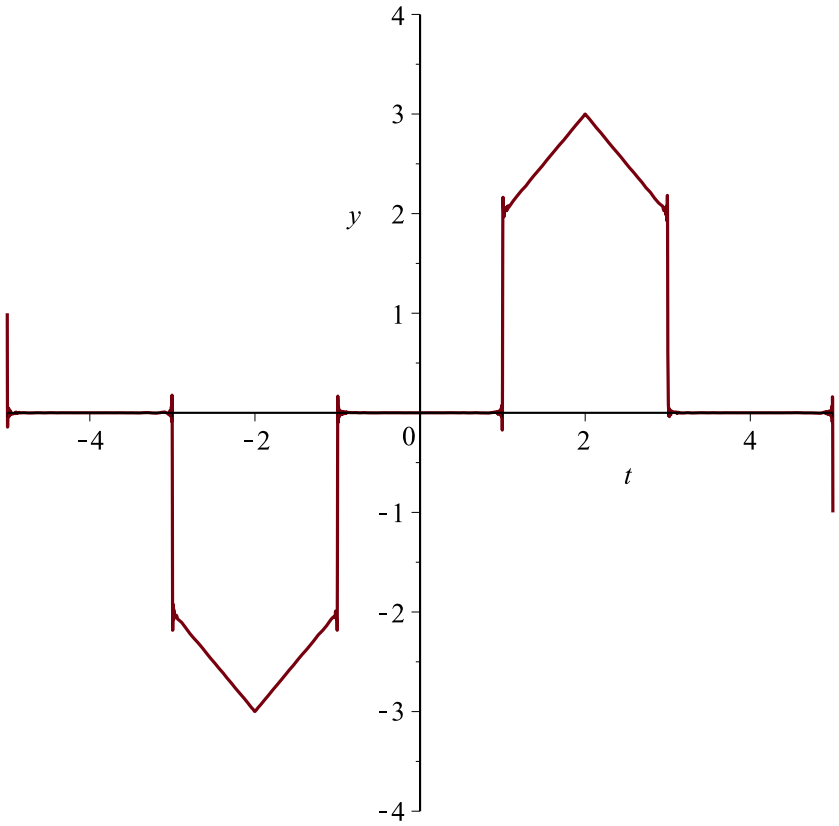
> $a[n] := \frac{1}{L} \cdot int\left(h \cdot \cos\left(\frac{n \cdot \mathrm{Pi} \cdot t}{L}\right), t = -L..L\right)$

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

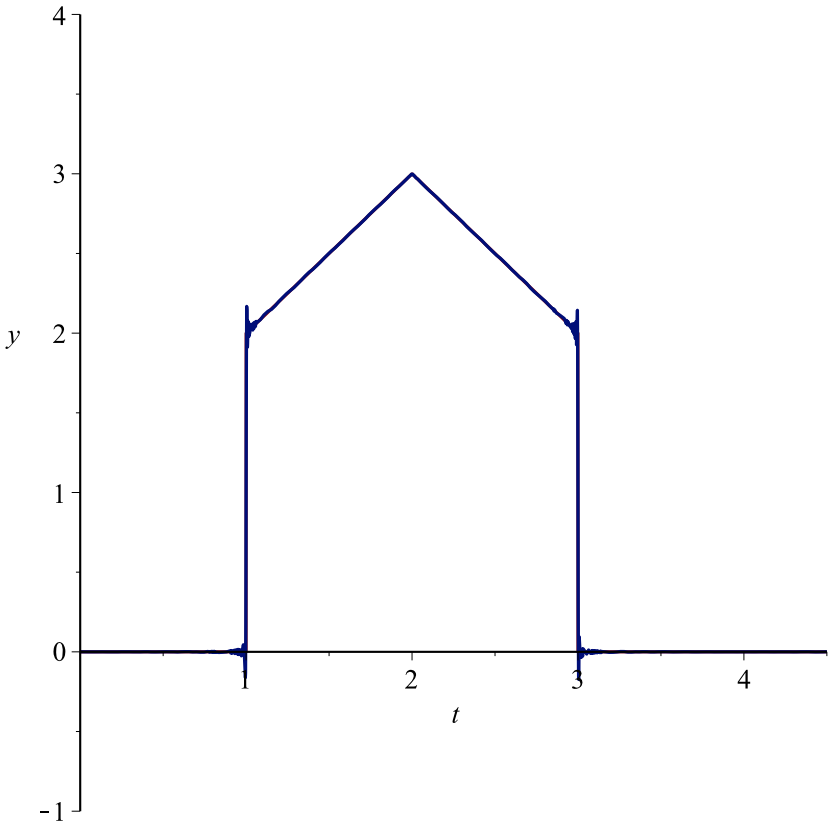
> $b[n] := \frac{1}{L} \cdot int\left(h \cdot \sin\left(\frac{n \cdot \mathrm{Pi} \cdot t}{L}\right), t = -L..L\right) :$

> $H[1000] := Sum\left(b[n] \cdot \sin\left(\frac{n \cdot \mathrm{Pi} \cdot t}{L}\right), n = 1..1000\right) :$

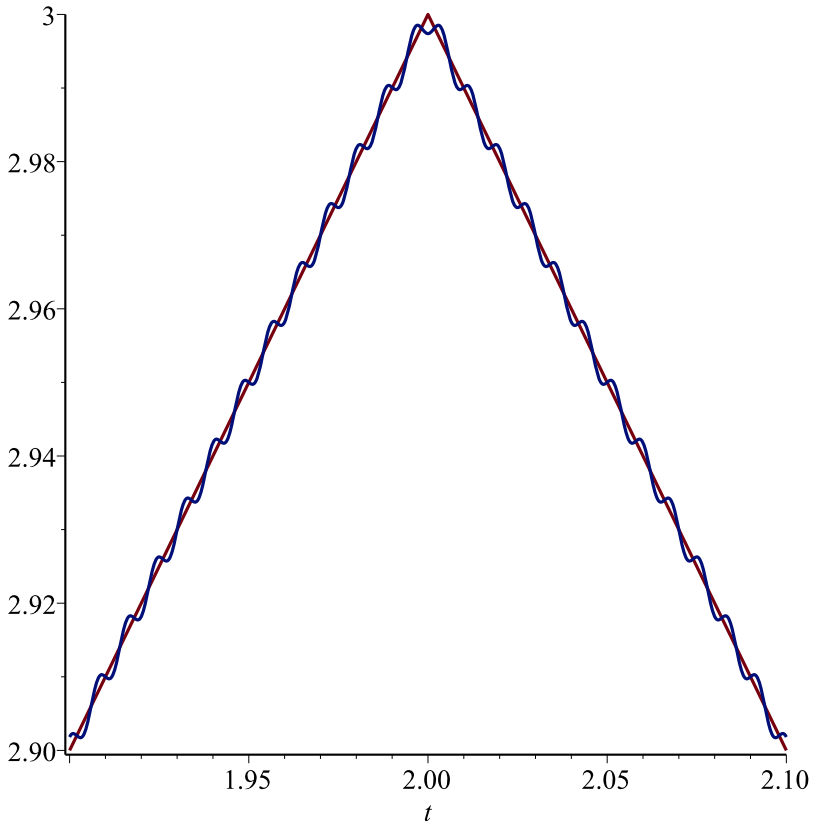
> $plot(H[1000], t = -5..5, y = -4..4)$



> $plot([f, H[1000]], t = 0..4.5, y = -1..4)$

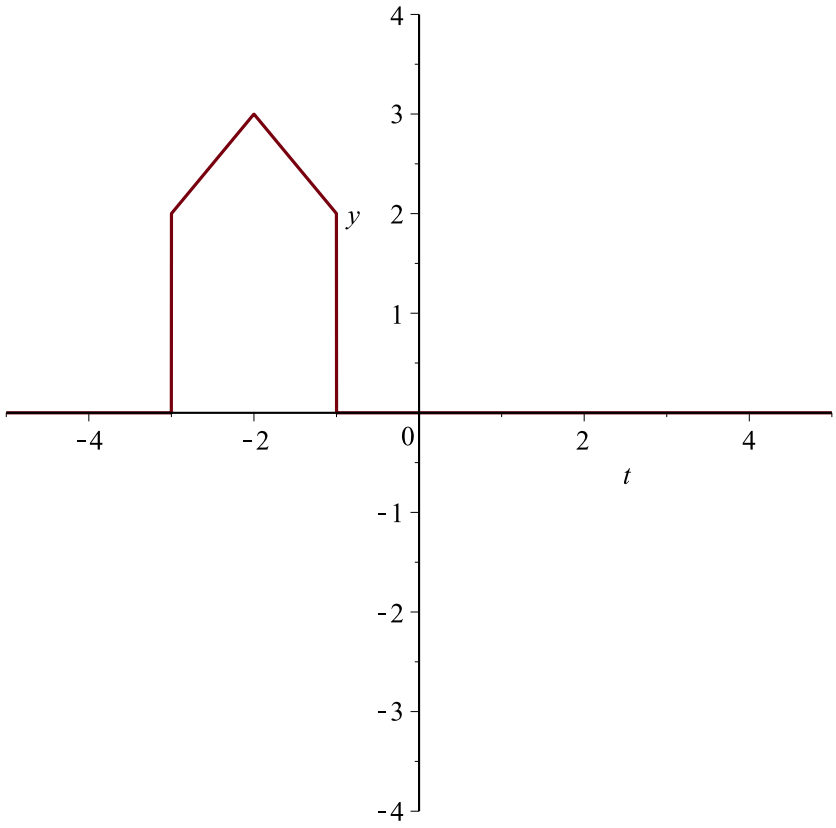


> $plot([f, H[1000]], t = 1.9..2.1)$

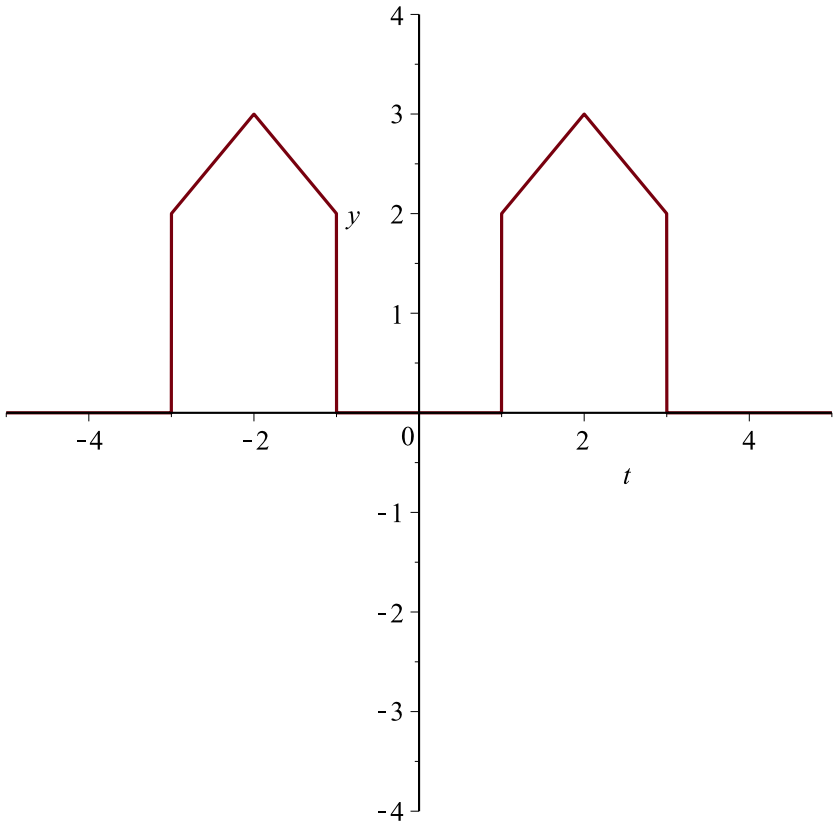



```
> j := 2·Heaviside(t + 3) + (t + 3)·Heaviside(t + 3) − 2·(t + 2)·Heaviside(t + 2) + (t + 1)
      ·Heaviside(t + 1) − 2·Heaviside(t + 1); plot( j, t = -5..5, y = -4..4)
```

$$j := 2\,\mathrm{Heaviside}(t+3) + (t+3)\,\mathrm{Heaviside}(t+3) - 2\,(t+2)\,\mathrm{Heaviside}(t+2) + (t+1)\,\mathrm{Heaviside}(t+1) - 2\,\mathrm{Heaviside}(t+1)$$



> $k := j + f : plot(k, t = -5..5, y = -4..4)$



> $aa[0] := \frac{1}{L} \cdot int(k, t = -L..L); cc := \frac{aa[0]}{2}$

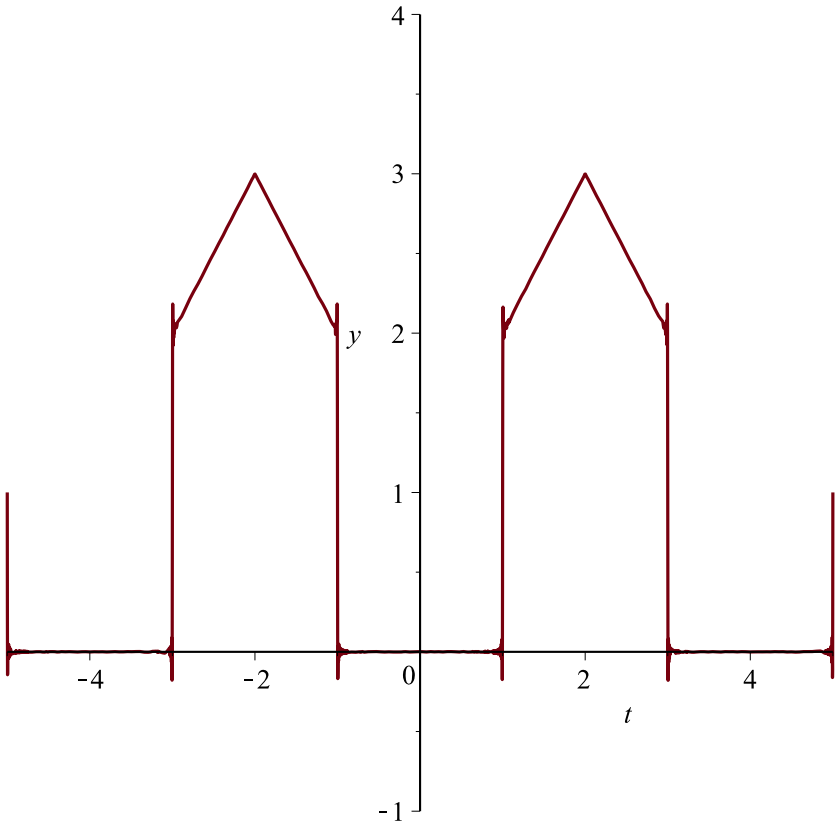
$$aa_0 := \frac{5}{2}$$

$$cc := \frac{5}{4} \qquad \textbf{(4)}$$

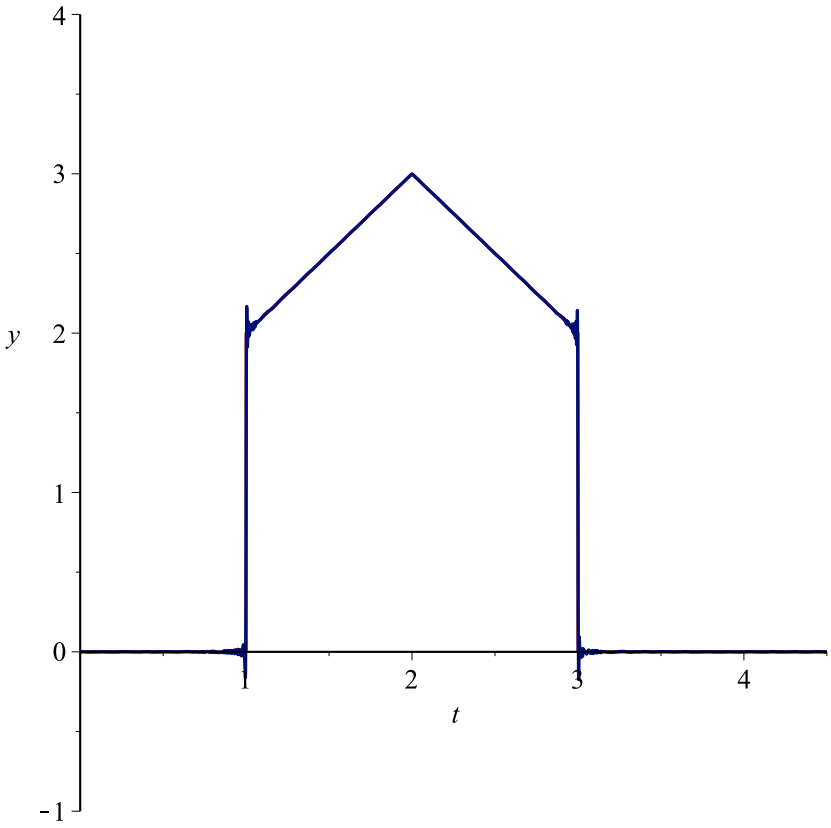
> $aa[n] := \frac{1}{L} \cdot int\left(k \cdot \cos\left(\frac{n \cdot \mathrm{Pi} \cdot t}{L}\right), t = -L..L\right) :$

> $K[1000] := cc + sum\left(aa[n] \cdot \cos\left(\frac{n \cdot \mathrm{Pi} \cdot t}{L}\right), n = 1..1000\right) :$

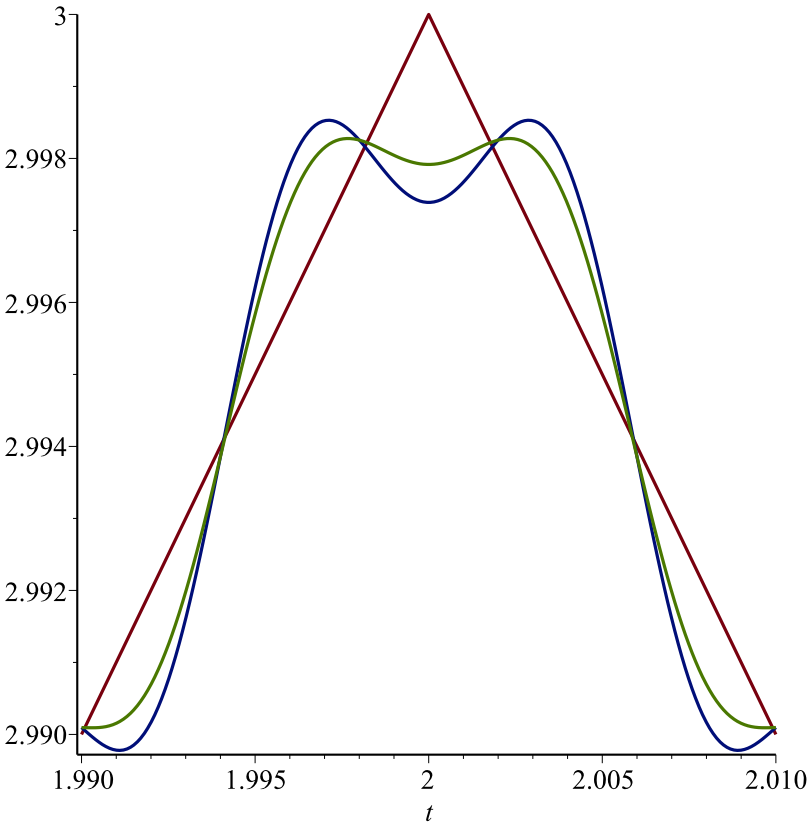
> $plot(K[1000], t = -5..5, y = -1..4)$



> $plot([f, K[1000]], t = 0..4.5, y = -1..4)$



> $plot([f, H[1000], K[1000]], t = 1.99..2.01)$



> $LL := 2$

$$LL := 2 \tag{5}$$

> $aaa[0] := \frac{1}{LL} \cdot int(f, t = 0..4);\ ccc := \frac{aaa[0]}{2}$

$$aaa_0 := \frac{5}{2}$$

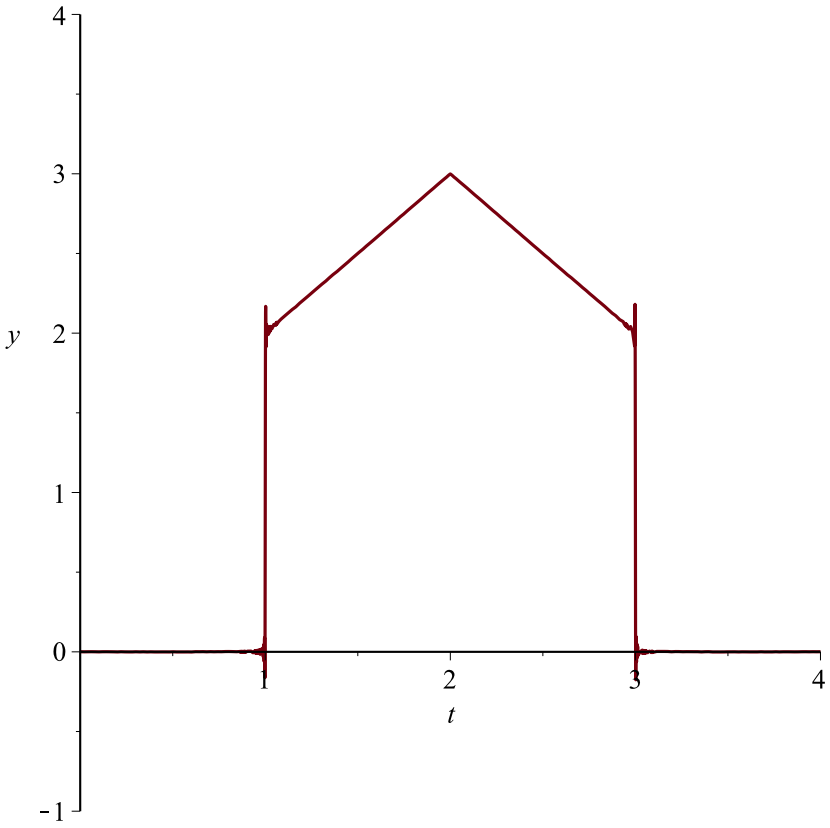
$$ccc := \frac{5}{4} \tag{6}$$

> $aaa[n] := \frac{1}{LL} \cdot int\left(f \cdot \cos\left(\frac{n \cdot \mathrm{Pi} \cdot t}{LL}\right), t = 0..4\right):$

> $bbb[n] := \frac{1}{LL} \cdot int\left(f \cdot \sin\left(\frac{n \cdot \mathrm{Pi} \cdot t}{LL}\right), t = 0..4\right):$

> $F[1000] := ccc + sum\left(aaa[n] \cdot \cos\left(\frac{n \cdot \mathrm{Pi} \cdot t}{LL}\right) + bbb[n] \cdot \sin\left(\frac{n \cdot \mathrm{Pi} \cdot t}{LL}\right), n = 1..1000\right):$

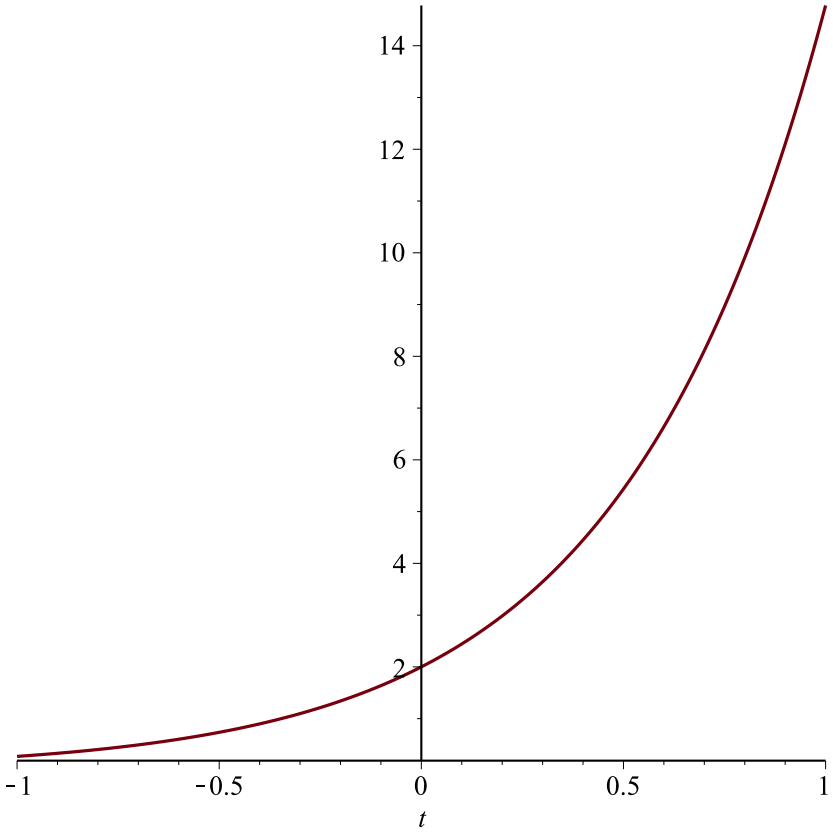
> $plot(F[1000], t = 0..4, y = -1..4)$




```
> restart
> f := 2·exp(2·t)
```

$$f := 2\,e^{2t} \tag{7}$$

```
> plot(f, t = -1 ..1)
```



> $L := 1$

$$L := 1 \tag{8}$$

> $a[0] := int(f, t = -1..1) : evalf(\%)$

$$7.253720816 \tag{9}$$

> $c := \frac{a[0]}{2}; evalf(\%)$

$$c := -\frac{1}{2}\,e^{-2} + \frac{1}{2}\,e^{2}$$

$$3.626860408 \tag{10}$$

> $a[n] := subs(\sin(n \cdot Pi) = 0, \cos(n \cdot Pi) = (-1)^{\cdot\cdot n}, int(f \cdot \cos(n \cdot Pi \cdot t), t = -1..1)); evalf(\%, 3)$

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

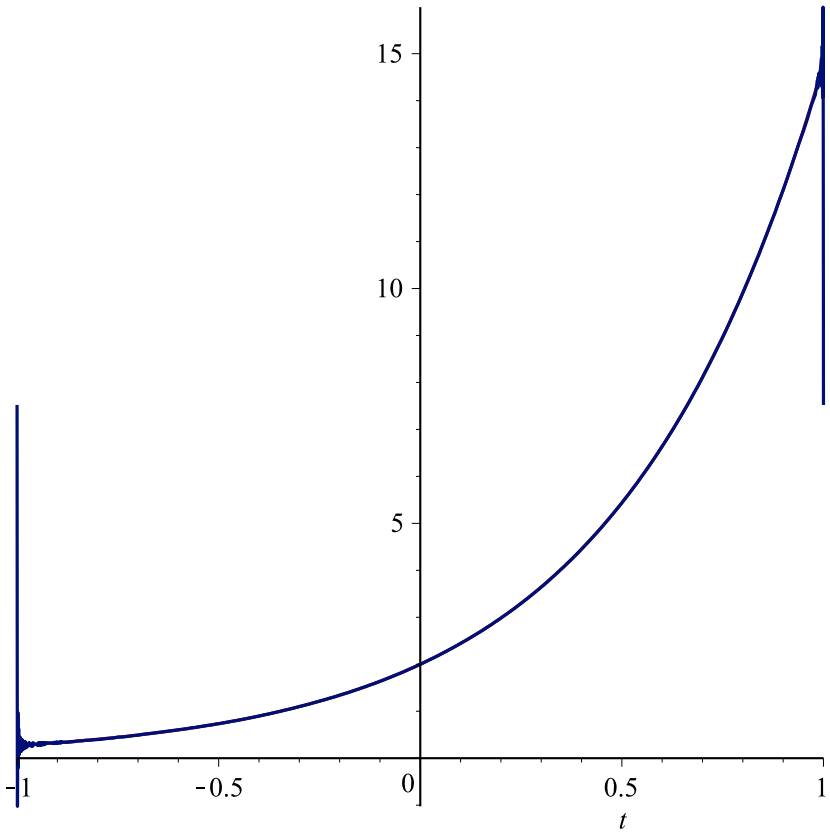
$$\frac{29.0\,(-1.)^{n}}{9.86\,n^{2} + 4.} \tag{11}$$

> $b[n] := subs(\sin(n \cdot Pi) = 0, \cos(n \cdot Pi) = (-1)^{\cdot\cdot n}, int(f \cdot \sin(n \cdot Pi \cdot t), t = -1..1)); evalf(\%, 3)$

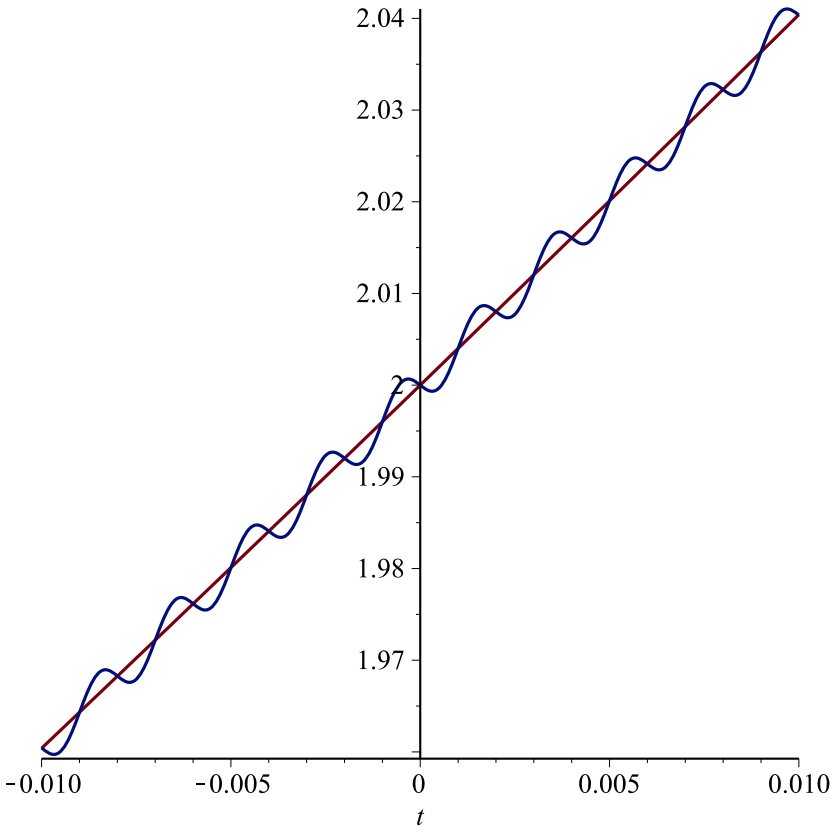
$$b_n := \frac{2\left(-e^{2}\,(-1)^{n}\,\pi\,n + e^{-2}\,(-1)^{n}\,\pi\,n\right)}{\pi^{2}\,n^{2} + 4}$$

$$-\frac{45.6\ (-1.)^n\ n}{9.86\ n^2+4.} \qquad \textbf{(12)}$$

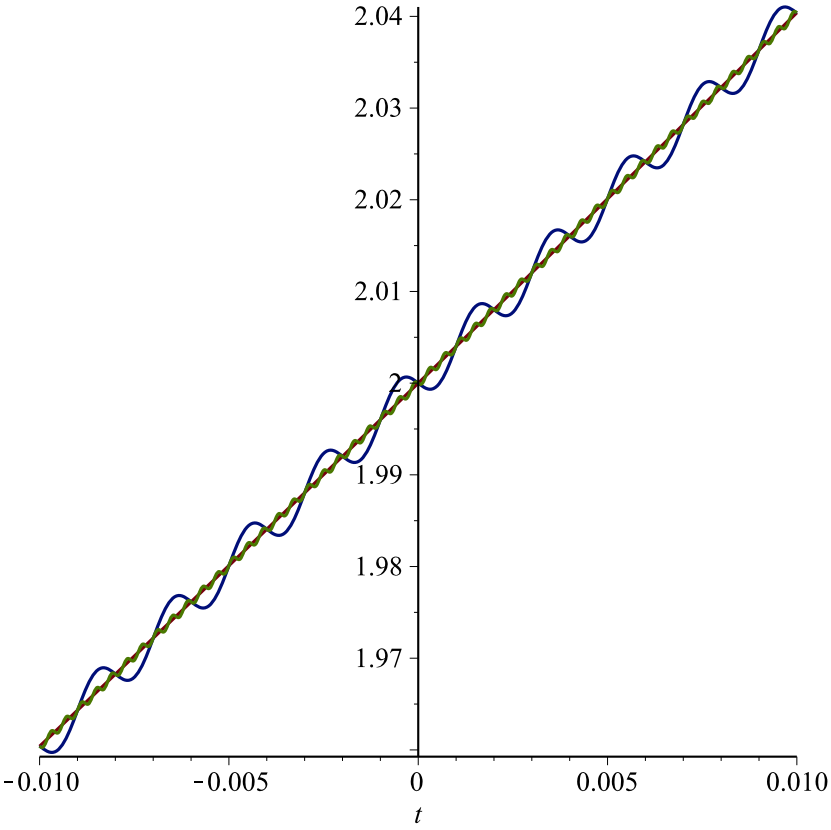
```
> F[1000] := c + sum(a[n]·cos(n·Pi·t) + b[n]·sin(n·Pi·t), n = 1..1000) :
> plot([f, F[1000]], t = -1..1)
```




```
> plot([f, F[1000]], t = -0.01..0.01)
```




```
> F[5000] := c + sum(a[n]·cos(n·Pi·t) + b[n]·sin(n·Pi·t), n = 1..5000) :
> plot([f, F[1000], F[5000]], t = -0.01..0.01)
```


2.04
2.03
2.02
2.01
2
1.99
1.98
1.97
-0.010
-0.005
0
0.005
0.010
t