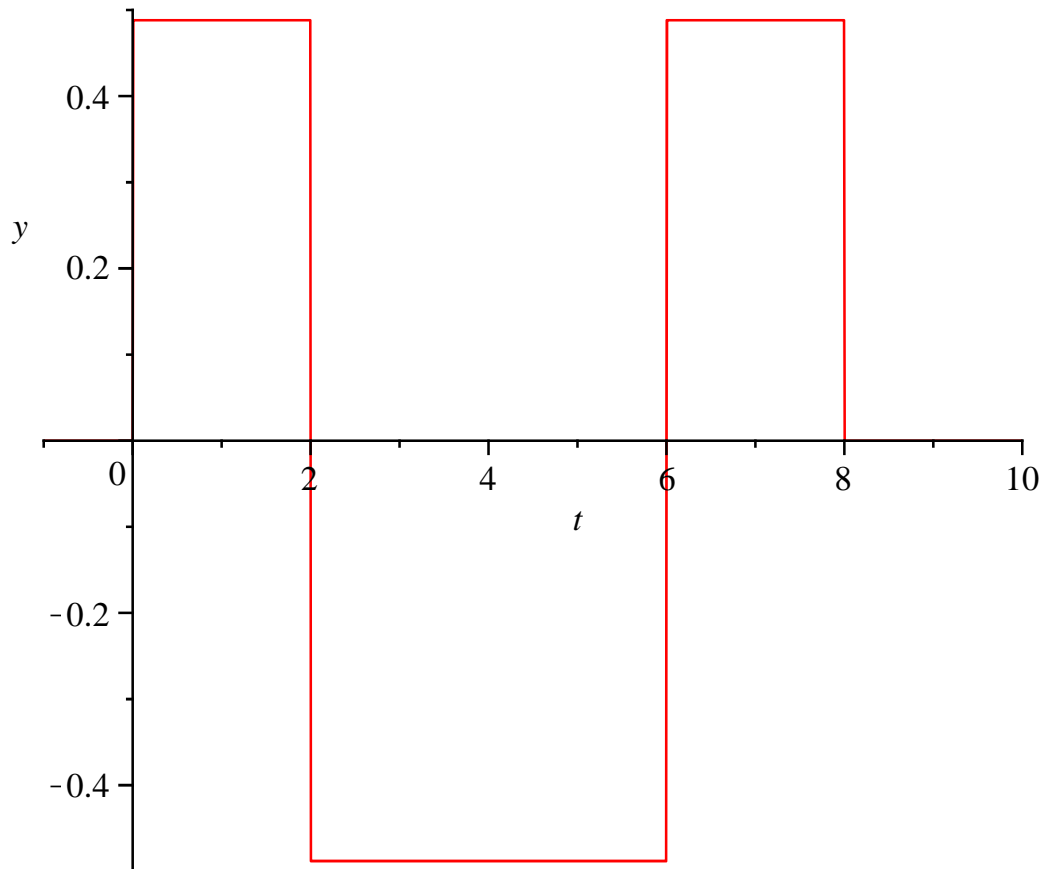


```
> restart
```

```
> S := 488/1000 * Heaviside(t) - 2*488/1000 * Heaviside(t - a) + 2*488/1000 * Heaviside(t - 3 a)
      - 488/1000 * Heaviside(t - 4 a); plot(subs(a = 2, S), t = -1 .. 10, y = -0.5 .. 0.5)
```

```
S := 61/125 Heaviside(t) - 122/125 Heaviside(t - a) + 122/125 Heaviside(t - 3 a)
      - 61/125 Heaviside(t - 4 a)
```



```
> Ecuacion := diff(y(t), t$3) = S
```

```
Ecuacion := d^3 y(t) = 61/125 Heaviside(t) - 122/125 Heaviside(t - a) + 122/125 Heaviside(t
      - 3 a) - 61/125 Heaviside(t - 4 a) (1)
```

e.d.o.(3).L.cc.NH

```
> Condiciones := y(0) = 0, D(y)(0) = 0, D(D(y))(0) = 0
```

```
Condiciones := y(0) = 0, D(y)(0) = 0, D^(2)(y)(0) = 0 (2)
```

```
> with(inttrans) :
```

```
> TransLapEcua := subs(Condiciones, laplace(Ecuacion, t, s))
```

```
TransLapEcua := s^3 laplace(y(t), t, s) = 61/125 s - 122/125 laplace(Heaviside(t - a), t, s) (3)
```

$$+ \frac{122}{125} \text{laplace}(\text{Heaviside}(t - 3a), t, s) - \frac{61}{125} \text{laplace}(\text{Heaviside}(t - 4a), t, s)$$

> *TransLapSolucion* := isolate(*TransLapEcua*, laplace(*y*(*t*), *t*, *s*))

$$\text{TransLapSolucion} := \text{laplace}(y(t), t, s) = \frac{1}{s^3} \left(\frac{61}{125s} - \frac{122}{125} \text{laplace}(\text{Heaviside}(t - a), t, s) \right. \\ \left. + \frac{122}{125} \text{laplace}(\text{Heaviside}(t - 3a), t, s) - \frac{61}{125} \text{laplace}(\text{Heaviside}(t - 4a), t, s) \right) \quad (4)$$

> *Solucion* := invlaplace(*TransLapSolucion*, *s*, *t*)

$$\text{Solucion} := y(t) = \frac{61}{750} t^3 - \frac{122}{125} \text{Heaviside}(-a) a^3 - \frac{61}{750} \text{Heaviside}(t - 4a) (t - 4a)^3 \\ + \frac{61}{375} \text{Heaviside}(t - 3a) (t - 3a)^3 - \frac{61}{375} \text{Heaviside}(t - a) (t - a)^3 \quad (5)$$

> *RecorridoFinal* := subs(*t* = 4·*a*, rhs(*Solucion*)) = 210)

$$\text{RecorridoFinal} := \frac{1952}{375} a^3 - \frac{122}{125} \text{Heaviside}(-a) a^3 + \frac{61}{375} \text{Heaviside}(a) a^3 \\ - \frac{549}{125} \text{Heaviside}(3a) a^3 = 210 \quad (6)$$

> *TiempoFinalEntreCuatro* := solve($\frac{1952}{375} a^3 + \frac{61}{375} a^3 - \frac{549}{125} a^3 = 210, a$):evalf(%)

$$5.992248642, -2.996124322 + 5.189439554 I, -2.996124322 - 5.189439554 I \quad (7)$$

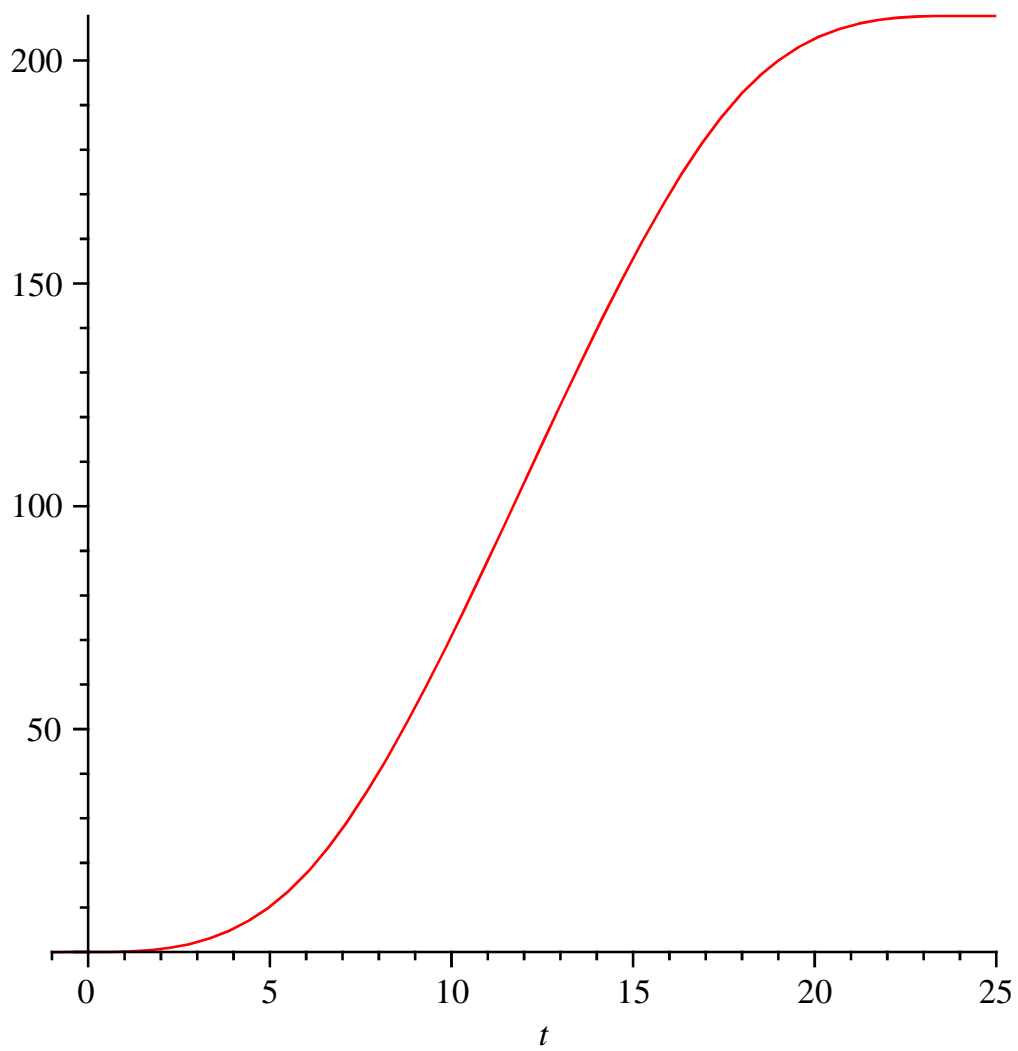
> *TiempoFinal* = *TiempoFinalEntreCuatro*₁·4 : evalf(%)

$$\text{TiempoFinal} = 23.96899457 \quad (8)$$

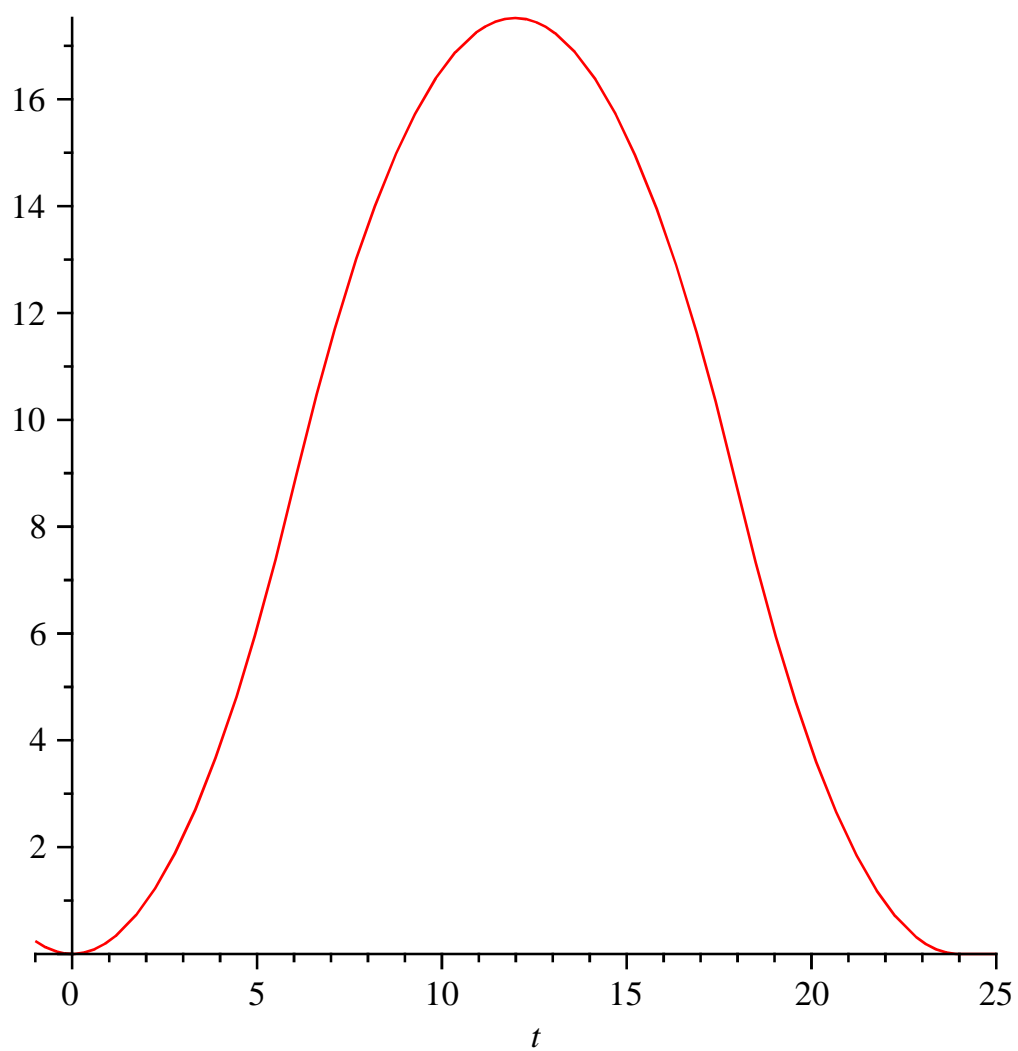
> *SolucionFinal* := subs(*a* = *TiempoFinalEntreCuatro*₁, *Solucion*)

$$\text{SolucionFinal} := y(t) = \frac{61}{750} t^3 - 210 \text{Heaviside}\left(-\frac{5}{61} 390705^{1/3}\right) - \frac{61}{750} \text{Heaviside}\left(t - \frac{20}{61} 390705^{1/3}\right) \\ \left(t - \frac{20}{61} 390705^{1/3}\right)^3 + \frac{61}{375} \text{Heaviside}\left(t - \frac{15}{61} 390705^{1/3}\right) \left(t - \frac{15}{61} 390705^{1/3}\right)^3 \\ - \frac{61}{375} \text{Heaviside}\left(t - \frac{5}{61} 390705^{1/3}\right) \left(t - \frac{5}{61} 390705^{1/3}\right)^3 \quad (9)$$

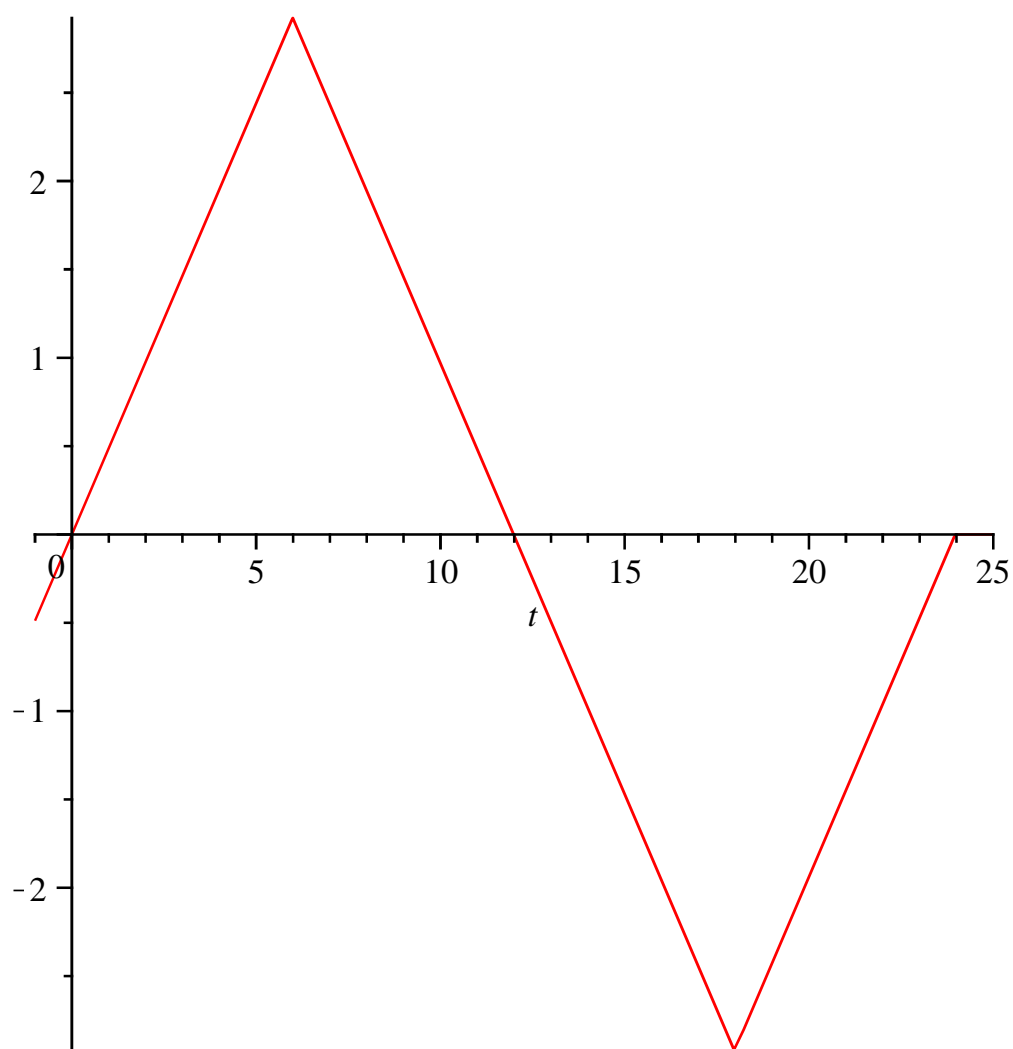
> plot(rhs(*SolucionFinal*), *t* = -1 .. 25)



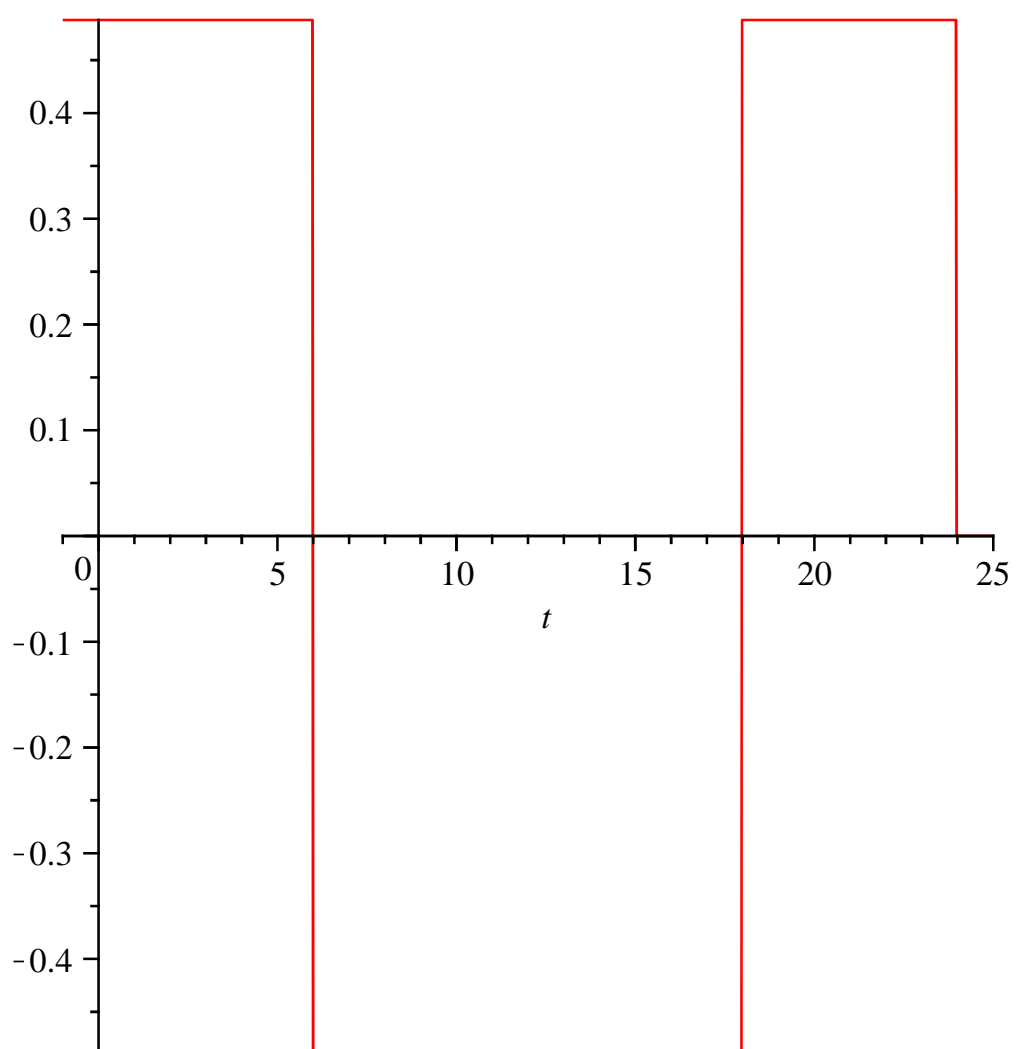
`> plot(rhs(diff(SolucionFinal, t)), t=-1..25)`



`> plot(rhs(diff(SolucionFinal, t$2)), t=-1 ..25)`



`> plot(rhs(diff(SolucionFinal, t$3)), t=-1 ..25)`



[>
[>
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