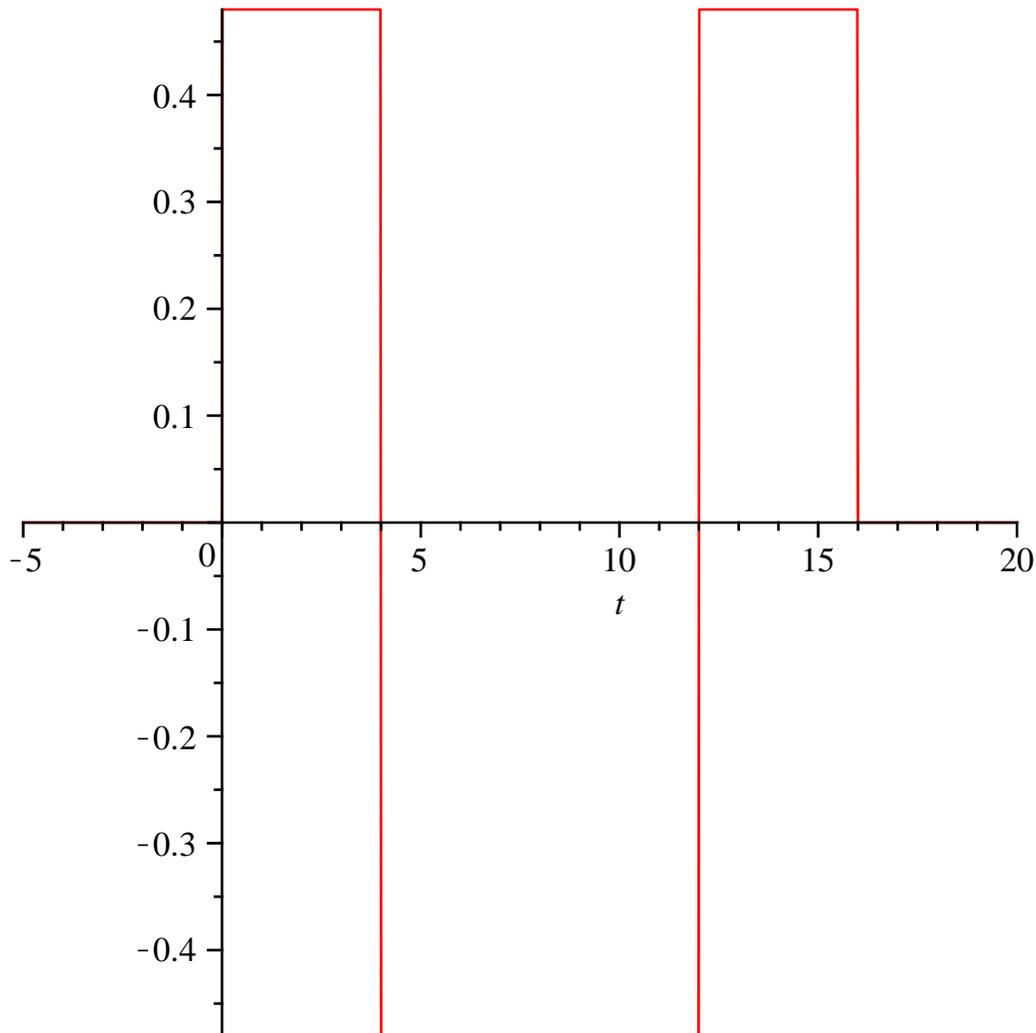


```
> restart
```

```
> S :=  $\frac{48}{100} \cdot \text{Heaviside}(t) - \frac{96}{100} \cdot \text{Heaviside}(t - a) + \frac{96}{100} \cdot \text{Heaviside}(t - 3 \cdot a) - \frac{48}{100} \cdot \text{Heaviside}(t - 4 \cdot a)$ ; plot(subs(a = 4, S), t = -5..20)
```

```
S :=  $\frac{12}{25} \text{Heaviside}(t) - \frac{24}{25} \text{Heaviside}(t - a) + \frac{24}{25} \text{Heaviside}(t - 3 a) - \frac{12}{25} \text{Heaviside}(t - 4 a)$ 
```



```
> Ecuacion := diff(y(t), t$3) = subs(a =  $\frac{609}{100}$ , S)
```

$$\text{Ecuacion} := \frac{d^3}{dt^3} y(t) = \frac{12}{25} \text{Heaviside}(t) - \frac{24}{25} \text{Heaviside}\left(t - \frac{609}{100}\right) + \frac{24}{25} \text{Heaviside}\left(t - \frac{1827}{100}\right) - \frac{12}{25} \text{Heaviside}\left(t - \frac{609}{25}\right) \quad (1)$$

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

$$\text{CondicionesIniciales} := y(0) = 0, D(y)(0) = 0, D^{(2)}(y)(0) = 0 \quad (2)$$

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

```
> TransLapEcu := subs(CondicionesIniciales, laplace(Ecuacion, t, s))
```

$$\text{TransLapEcua} := s^3 \text{laplace}(y(t), t, s) = \frac{12}{25} \frac{1 - 2 e^{-\frac{609}{100} s} + 2 e^{-\frac{1827}{100} s} - e^{-\frac{609}{25} s}}{s} \quad (3)$$

> $\text{TransLapSolucion} := \text{isolate}(\text{TransLapEcua}, \text{laplace}(y(t), t, s))$

$$\text{TransLapSolucion} := \text{laplace}(y(t), t, s) = \frac{12}{25} \frac{1 - 2 e^{-\frac{609}{100} s} + 2 e^{-\frac{1827}{100} s} - e^{-\frac{609}{25} s}}{s^4} \quad (4)$$

> $\text{Solucion} := \text{invlaplace}(\text{TransLapSolucion}, s, t)$

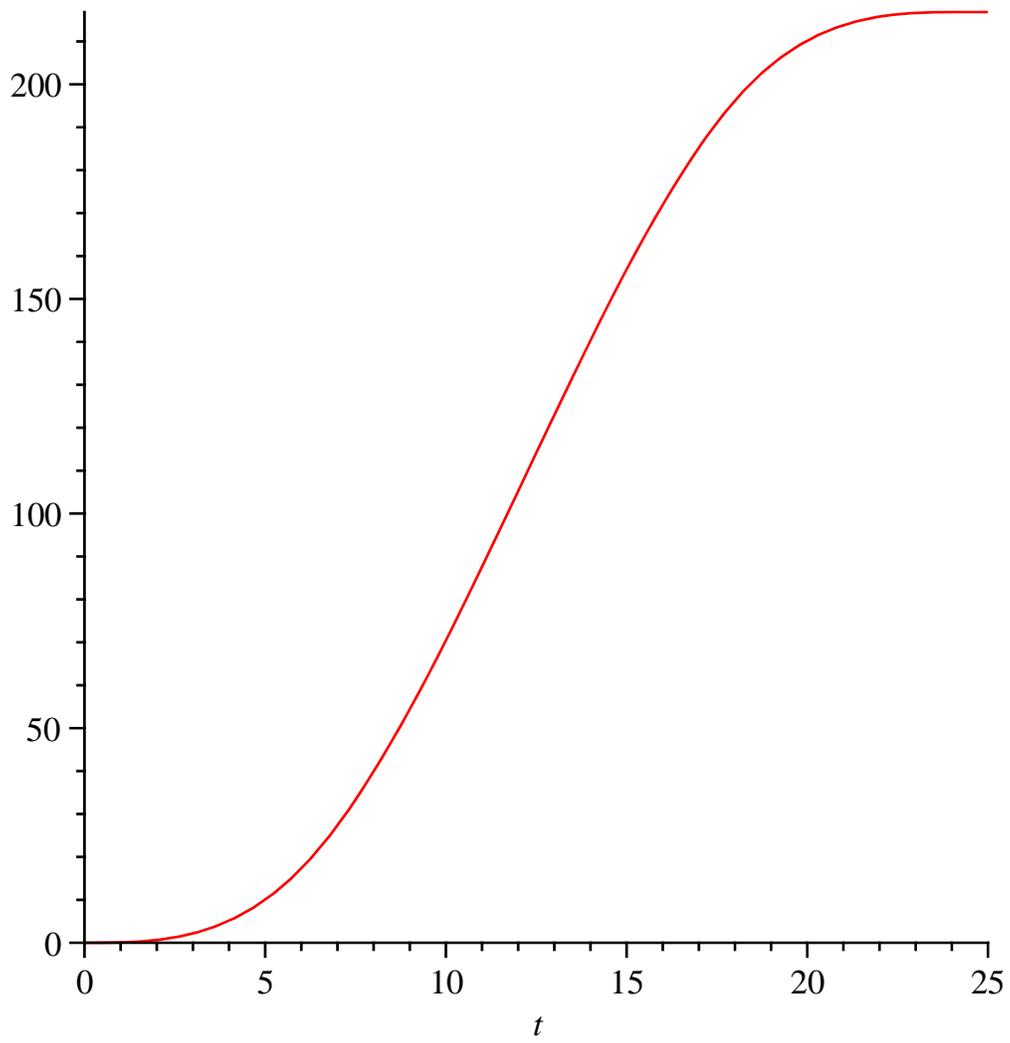
$$\text{Solucion} := y(t) = \frac{2}{25} t^3 - \frac{4}{25} \text{Heaviside}\left(t - \frac{609}{100}\right) \left(t - \frac{609}{100}\right)^3 + \frac{4}{25} \text{Heaviside}\left(t - \frac{1827}{100}\right) \left(t - \frac{1827}{100}\right)^3 - \frac{2}{25} \text{Heaviside}\left(t - \frac{609}{25}\right) \left(t - \frac{609}{25}\right)^3 \quad (5)$$

> $\text{evalf}\left(\text{subs}\left(t = \frac{609}{100} \cdot 4, \text{Solucion}\right)\right)$

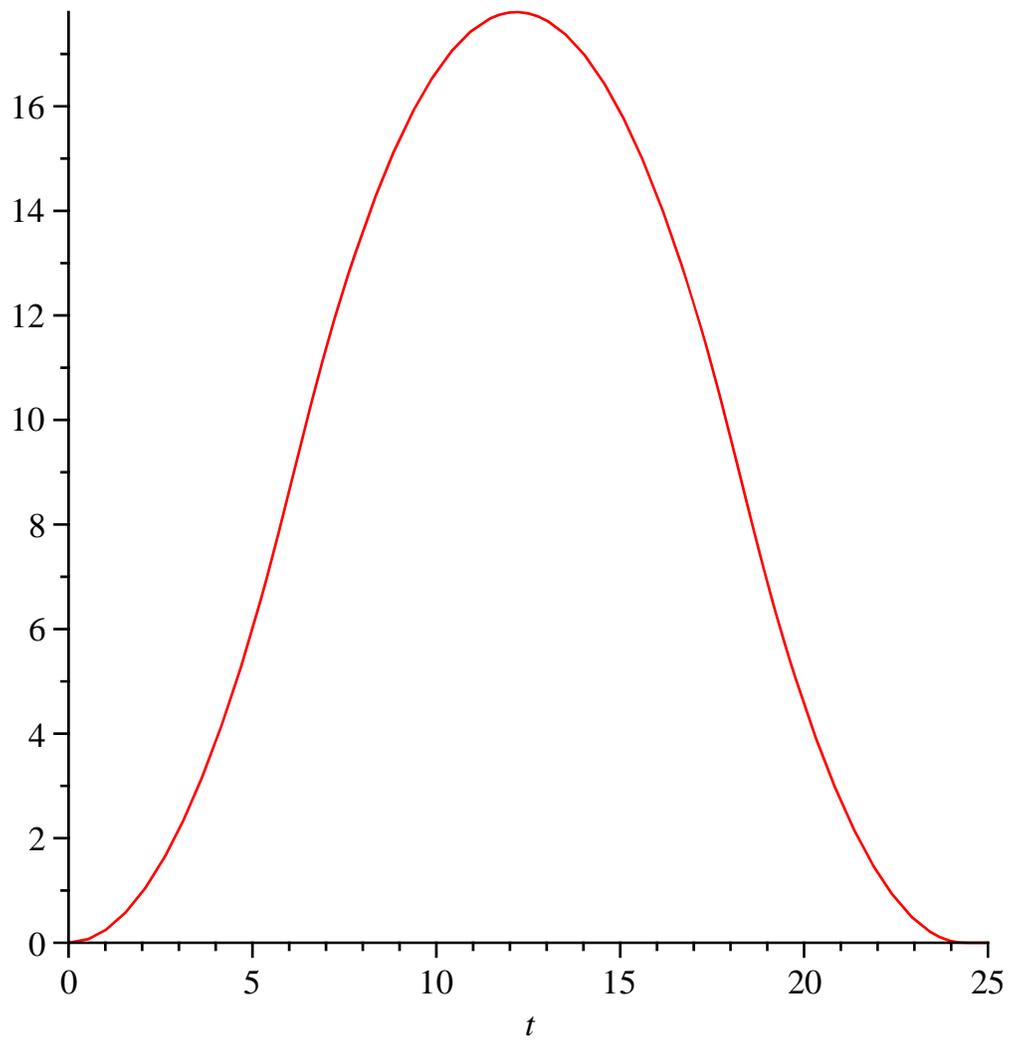
$$y\left(\frac{609}{25}\right) = 216.8318673 \quad (6)$$

>

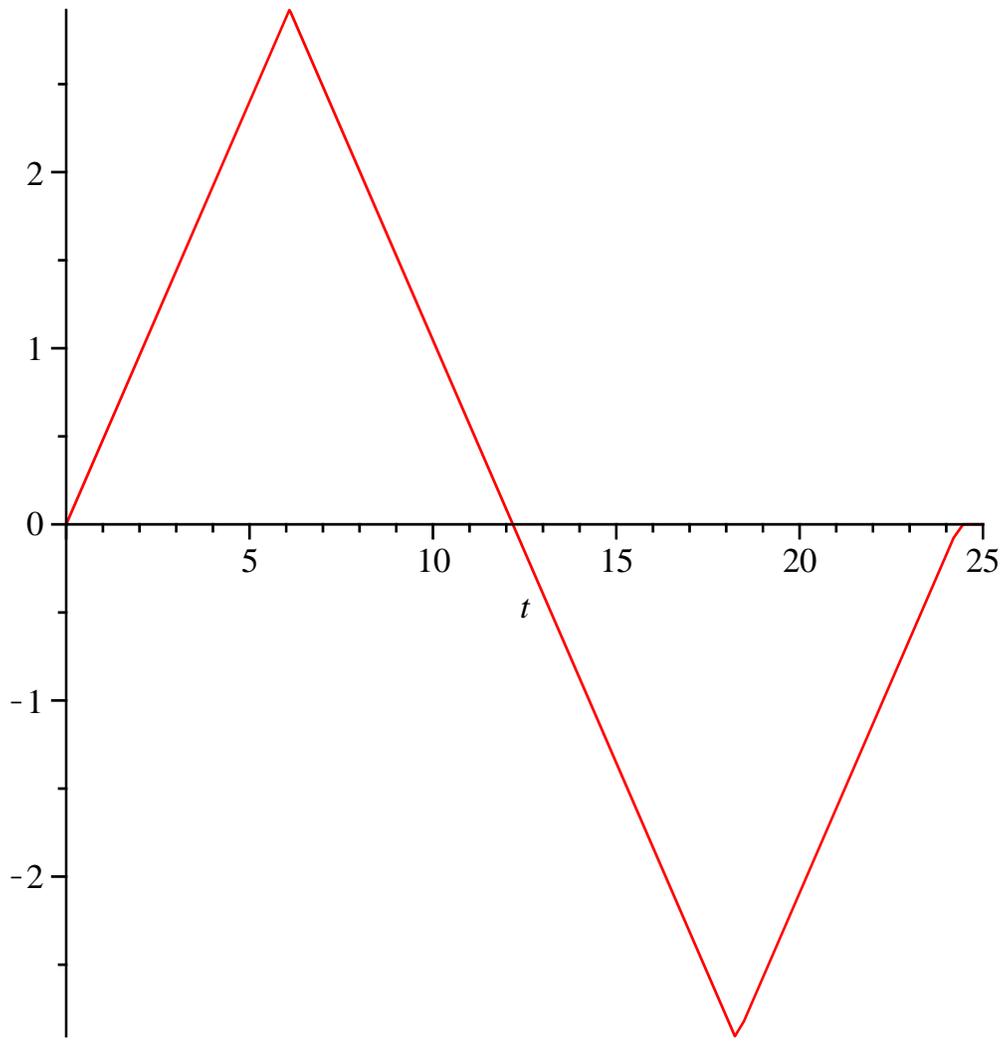
> $\text{plot}(\text{rhs}(\text{Solucion}), t = 0 .. 25)$



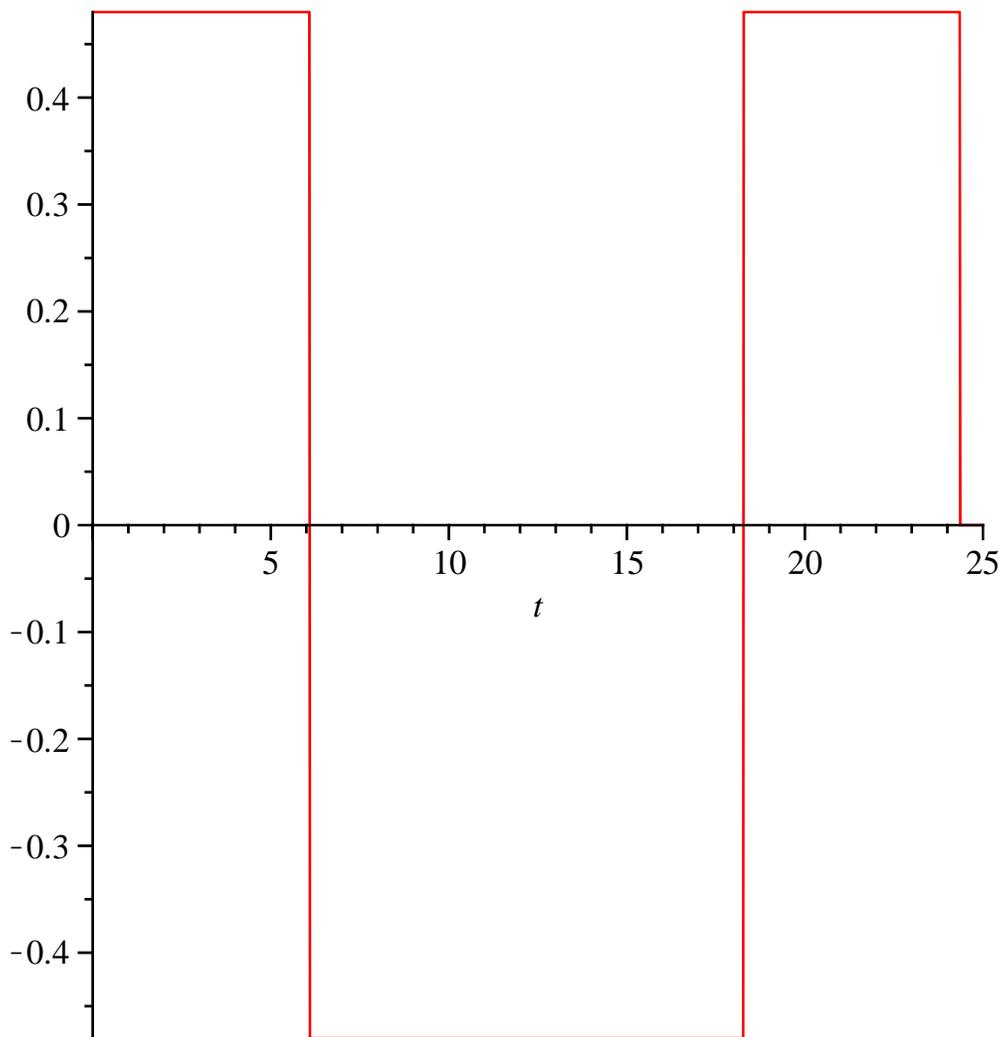
```
> plot(rhs(diff(Solucion, t)), t=0..25)
```



`> plot(rhs(diff(Solucion, t$2)), t=0..25)`



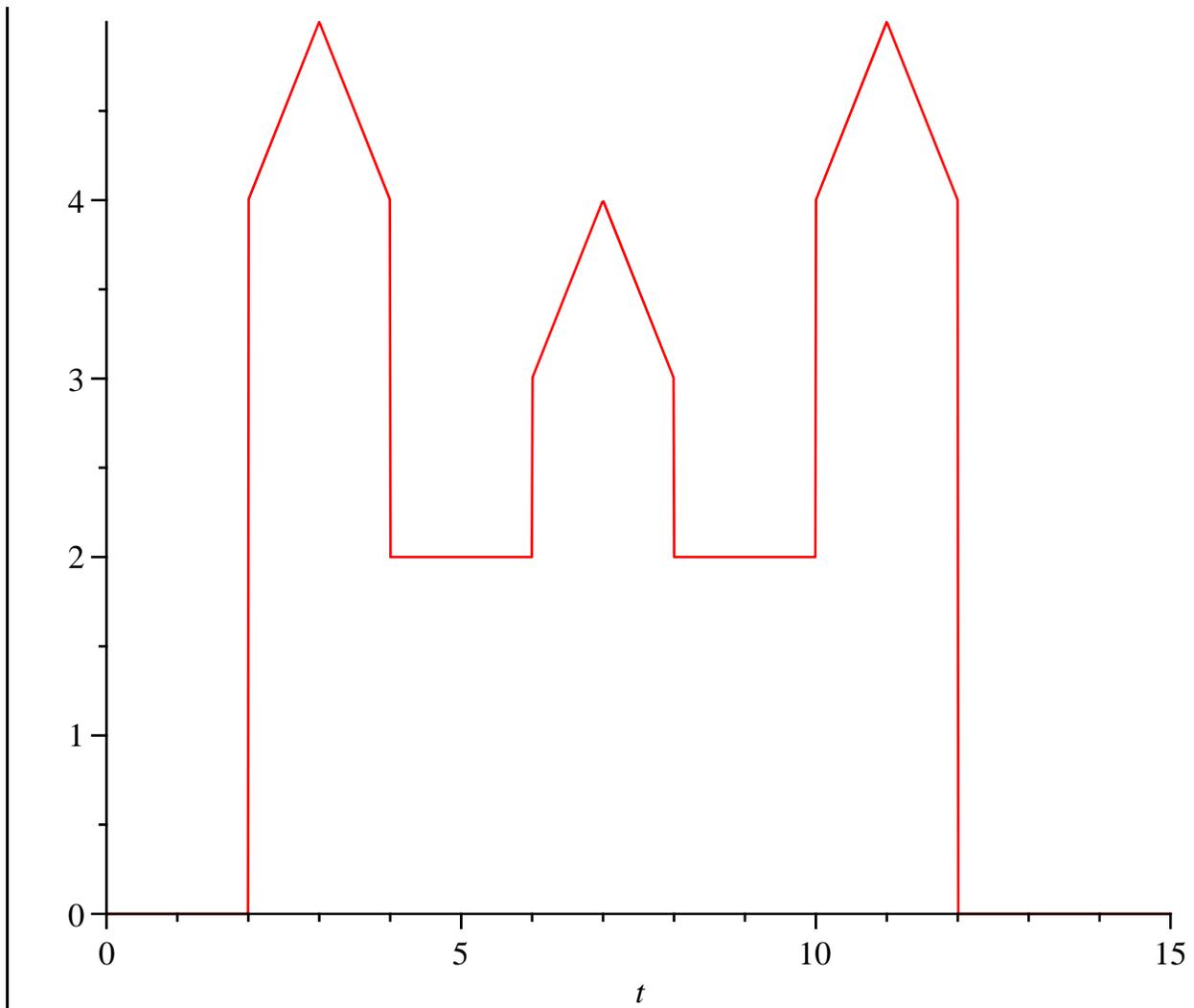
```
> plot(rhs(diff(Solucion, t$3)), t=0..25)
```



```
> restart
```

```
> Castle := 4·Heaviside(t - 2) + (t - 2)·Heaviside(t - 2) - 2·(t - 3)·Heaviside(t - 3) + (t - 4)·Heaviside(t - 4) - 2·Heaviside(t - 4) + Heaviside(t - 6) + (t - 6)·Heaviside(t - 6) - 2·(t - 7)·Heaviside(t - 7) + (t - 8)·Heaviside(t - 8) - Heaviside(t - 8) + 2·Heaviside(t - 10) + (t - 10)·Heaviside(t - 10) - 2·(t - 11)·Heaviside(t - 11) + (t - 12)·Heaviside(t - 12) - 4·Heaviside(t - 12); plot(Castle, t=0..15)
```

```
Castle := 4 Heaviside(t - 2) + (t - 2) Heaviside(t - 2) - 2 (t - 3) Heaviside(t - 3) + (t - 4) Heaviside(t - 4) - 2 Heaviside(t - 4) + Heaviside(t - 6) + (t - 6) Heaviside(t - 6) - 2 (t - 7) Heaviside(t - 7) + (t - 8) Heaviside(t - 8) - Heaviside(t - 8) + 2 Heaviside(t - 10) + (t - 10) Heaviside(t - 10) - 2 (t - 11) Heaviside(t - 11) + (t - 12) Heaviside(t - 12) - 4 Heaviside(t - 12)
```



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

```
> TLCastillo := laplace(Castle, t, s)
```

$$TLCastillo := \frac{e^{-2s} + e^{-12s} - 2e^{-11s} + e^{-10s} + e^{-8s} - 2e^{-7s} + e^{-6s} + e^{-4s} - 2e^{-3s}}{s^2}$$

(7)

$$+ \frac{4e^{-2s} - 4e^{-12s} + 2e^{-10s} - e^{-8s} + e^{-6s} - 2e^{-4s}}{s}$$

```
>
>
>
>
>
>
>
```