```
> restart
> h := 1/2 · (sin(2 t) · int(cos(2·tau)^2, tau = 0 ..t) − cos(2·t) · int(cos(2·tau) · sin(2·tau), tau = 0
      ..t))
```

$$h := \frac{\sin(2\,t)\left(\frac{\cos(2\,t)\,\sin(2\,t)}{4} + \frac{t}{2}\right)}{2} - \frac{\cos(2\,t)\left(\frac{1}{4} - \frac{\cos(2\,t)^2}{4}\right)}{2} \tag{1}$$

```
> hh := simplify(h)
```

$$hh := \frac{\sin(2\,t)\,t}{4} \tag{2}$$

```
> with(inttrans) :
> H := s/(s^2 + 4)^2
```

$$H := \frac{s}{(s^2+4)^2} \tag{3}$$

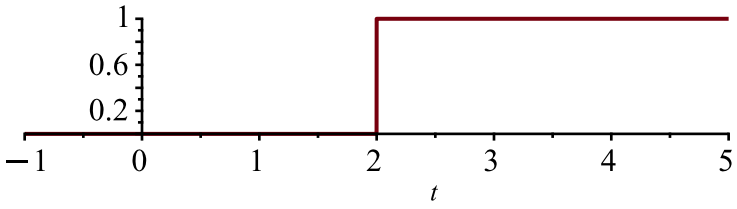
```
> hhh := invlaplace(H, s, t)
```

$$hhh := \frac{\sin(2\,t)\,t}{4} \tag{4}$$

```
> restart
> u(t − 2) := Heaviside(t − 2)
```

$$u(t-2) := \text{Heaviside}(t-2) \tag{5}$$

```
> plot(u(t − 2), t = −1 ..5, scaling = CONSTRAINED)
```



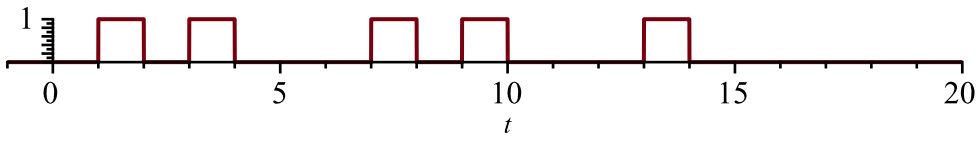

```
> with(inttrans) :
> U := laplace(u(t − 2), t, s)
```

$$U := \frac{e^{-2\,s}}{s} \tag{6}$$

```
> f := Heaviside(t − 1) − Heaviside(t − 2) + Heaviside(t − 3) − Heaviside(t − 4)
       + Heaviside(t − 7) − Heaviside(t − 8) + Heaviside(t − 9) − Heaviside(t − 10)
       + Heaviside(t − 13) − Heaviside(t − 14)
```

$$f := \text{Heaviside}(t-1) - \text{Heaviside}(t-2) + \text{Heaviside}(t-3) - \text{Heaviside}(t-4) + \text{Heaviside}(t-7) - \text{Heaviside}(t-8) + \text{Heaviside}(t-9) - \text{Heaviside}(t-10) + \text{Heaviside}(t-13) - \text{Heaviside}(t-14) \tag{7}$$

```
> plot(f, t = −1 ..20, scaling = CONSTRAINED)
```



> $F := laplace(f, t, s)$

$$F := \frac{e^{-s} - e^{-2s} + e^{-3s} - e^{-4s} + e^{-7s} - e^{-8s} + e^{-9s} - e^{-10s} + e^{-13s} - e^{-14s}}{s} \quad (8)$$

> $j := t - 2$

$$j := t - 2 \quad (9)$$

> $J := laplace(j, t, s)$

$$J := \frac{1}{s^2} - \frac{2}{s} \quad (10)$$

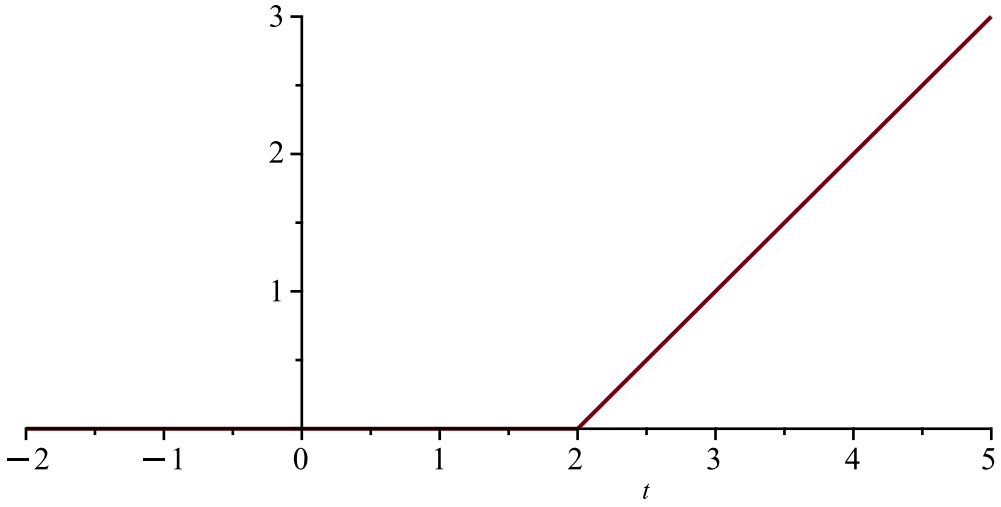
> $r(t-2) := (t-2)\cdot \mathrm{Heaviside}(t-2)$

$$r(t-2) := (t-2)\ \mathrm{Heaviside}(t-2) \quad (11)$$

> $R := laplace(r(t-2), t, s)$

$$R := \frac{e^{-2s}}{s^2} \quad (12)$$

> $plot(r(t-2), t = -2..5, scaling = CONSTRAINED)$



> $k := \mathrm{Dirac}(t-2)$

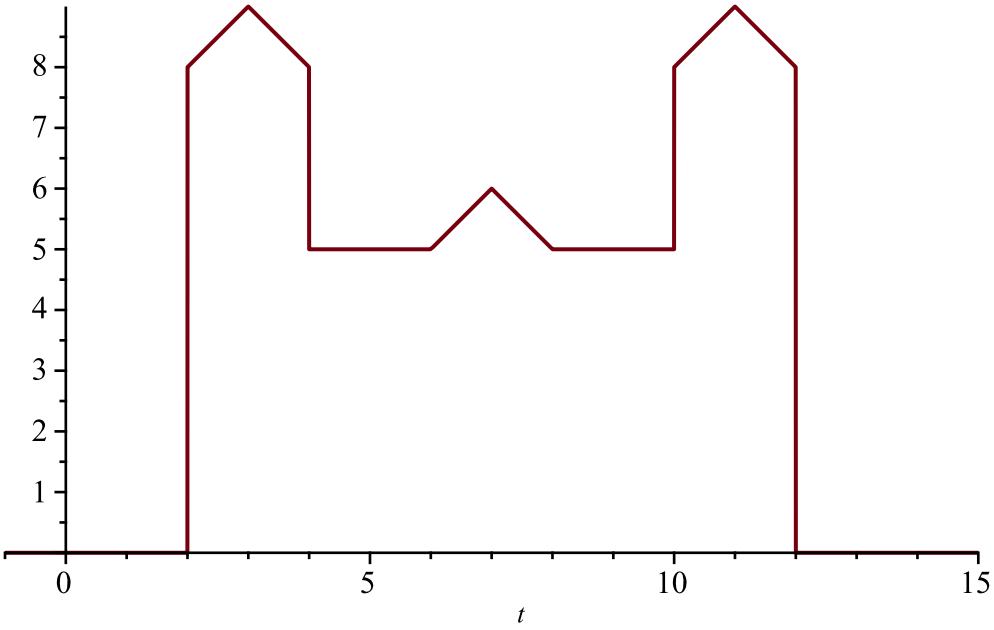
$$k := \mathrm{Dirac}(t-2) \tag{13}$$

> $K := laplace(k, t, s)$

$$K := e^{-2s} \tag{14}$$

> *restart*

> $Castillo := 8\cdot \mathrm{Heaviside}(t-2) + (t-2)\cdot\mathrm{Heaviside}(t-2) - 2\cdot(t-3)\cdot\mathrm{Heaviside}(t-3) + (t-4)\cdot\mathrm{Heaviside}(t-4) - 3\cdot\mathrm{Heaviside}(t-4) + (t-6)\cdot\mathrm{Heaviside}(t-6) - 2\cdot(t-7)\cdot\mathrm{Heaviside}(t-7) + (t-8)\cdot\mathrm{Heaviside}(t-8) + 3\cdot\mathrm{Heaviside}(t-10) + (t-10)\cdot\mathrm{Heaviside}(t-10) - 2\cdot(t-11)\cdot\mathrm{Heaviside}(t-11) + (t-12)\cdot\mathrm{Heaviside}(t-12) - 8\cdot\mathrm{Heaviside}(t-12) : plot(Castillo, t=-1..15, scaling=CONSTRAINED)$




```
> with(inttrans) :
> CASTILLO := laplace(Castillo, t, s)
```

$$CASTILLO := \frac{e^{-2s} + e^{-12s} - 2e^{-11s} + e^{-10s} + e^{-8s} - 2e^{-7s} + e^{-6s} + e^{-4s} - 2e^{-3s}}{s^2} + \frac{8e^{-2s} - 8e^{-12s} + 3e^{-10s} - 3e^{-4s}}{s} \quad \textbf{(15)}$$

```
>
>
>
>
>
```