

```

> restart
> Ecua := y'' - 7·y' + 12·y = 0

```

$$Ecua := \frac{d^2}{dx^2} y(x) - 7 \frac{d}{dx} y(x) + 12 y(x) = 0 \quad (1)$$

```

> CondIni := y(0) = 1, D(y)(0) = -2

```

$$CondIni := y(0) = 1, D(y)(0) = -2 \quad (2)$$

```

> with(inttrans)
[addtable, fourier, fouriercos, fouriersin, hankel, hilbert, invfourier, invhilbert, invlaplace,
 invmellin, laplace, mellin, savetable, setup]

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```

> EcuaTL := subs(CondIni, laplace(Ecua, x, s))

```

$$EcuaTL := s^2 \mathcal{L}(y(x), x, s) + 9 - s - 7 s \mathcal{L}(y(x), x, s) + 12 \mathcal{L}(y(x), x, s) = 0 \quad (4)$$

```

> SolTL := isolate(EcuaTL, laplace(y(x), x, s))

```

$$SolTL := \mathcal{L}(y(x), x, s) = \frac{s - 9}{s^2 - 7 s + 12} \quad (5)$$

```

> SolPart := invlaplace(SolTL, s, x)

```

$$SolPart := y(x) = 6 e^{3x} - 5 e^{4x} \quad (6)$$

```

> restart
> Ecua := diff(y(t), t, t) + 4·diff(y(t), t) + 4·y(t) = 5·exp(-2·t) + 4·t^2 + 2·cos(t)

```

$$Ecua := \frac{d^2}{dt^2} y(t) + 4 \frac{d}{dt} y(t) + 4 y(t) = 5 e^{-2t} + 4 t^2 + 2 \cos(t) \quad (7)$$

```

> CondIni := y(0) = -8, D(y)(0) = 15

```

$$CondIni := y(0) = -8, D(y)(0) = 15 \quad (8)$$

```

> with(inttrans) :
> EcuaTL := subs(CondIni, laplace(Ecua, t, s))

```

$$EcuaTL := s^2 \mathcal{L}(y(t), t, s) + 17 + 8 s + 4 s \mathcal{L}(y(t), t, s) + 4 \mathcal{L}(y(t), t, s) = \frac{5}{s + 2} + \frac{8}{s^3} + \frac{2 s}{s^2 + 1} \quad (9)$$

```

> SolTL := simplify(isolate(EcuaTL, laplace(y(t), t, s)))

```

$$SolTL := \mathcal{L}(y(t), t, s) = \frac{\frac{5}{s + 2} + \frac{8}{s^3} + \frac{2 s}{s^2 + 1} - 8 s - 17}{s^2 + 4 s + 4} \quad (10)$$

```

> SolPart := simplify(invlaplace(SolTL, s, t))

```

$$SolPart := y(t) = \frac{3}{2} + \frac{6 \cos(t)}{25} + \frac{8 \sin(t)}{25} + t^2 - 2 t + \frac{e^{-2t} (125 t^2 - 140 t - 487)}{50} \quad (11)$$

```

> Ecua; CondIni

```

$$\frac{d^2}{dt^2} y(t) + 4 \frac{d}{dt} y(t) + 4 y(t) = 5 e^{-2t} + 4 t^2 + 2 \cos(t)$$

$$y(0) = -8, D(y)(0) = 15 \quad (12)$$

> *ComprobarCero* := simplify(eval(subs(y(t) = rhs(SolPart), lhs(Ecua) - rhs(Ecua) = 0)))
ComprobarCero := 0 = 0 (13)

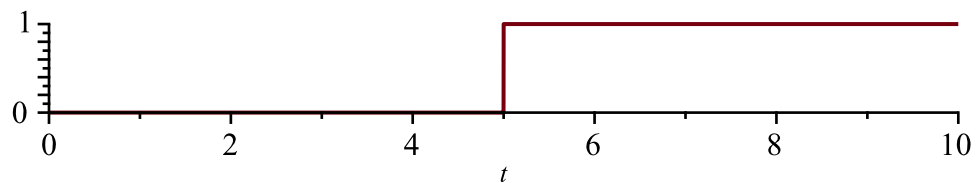
> *ComprobarUno* := simplify(subs(t = 0, SolPart))
ComprobarUno := y(0) = -8 (14)

> *ComprobarDos* := D(y)(0) = simplify(subs(t = 0, rhs(diff(SolPart, t))))
ComprobarDos := D(y)(0) = 15 (15)

> restart

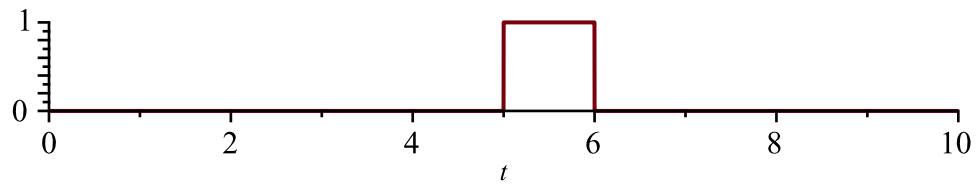
> *FuncUnitaria* := Heaviside(t - 5)
FuncUnitaria := Heaviside(t - 5) (16)

> plot(*FuncUnitaria*, t = 0 .. 10, scaling = CONSTRAINED)



> *FuncPulso* := Heaviside(t - 5) - Heaviside(t - 6)
FuncPulso := Heaviside(t - 5) - Heaviside(t - 6) (17)

> plot(*FuncPulso*, t = 0 .. 10, scaling = CONSTRAINED)



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> with(inttrans) :
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```
> TLunitario := laplace(FuncUnitaria, t, s)
```

$$TLunitario := \frac{e^{-5s}}{s} \quad (18)$$

```
> TLpulso := laplace(FuncPulso, t, s)
```

$$TLpulso := \frac{e^{-5s} - e^{-6s}}{s} \quad (19)$$

```
> TLrampa := laplace((t - 5)·Heaviside(t - 5), t, s)
```

$$TLrampa := \frac{e^{-5s}}{s^2} \quad (20)$$

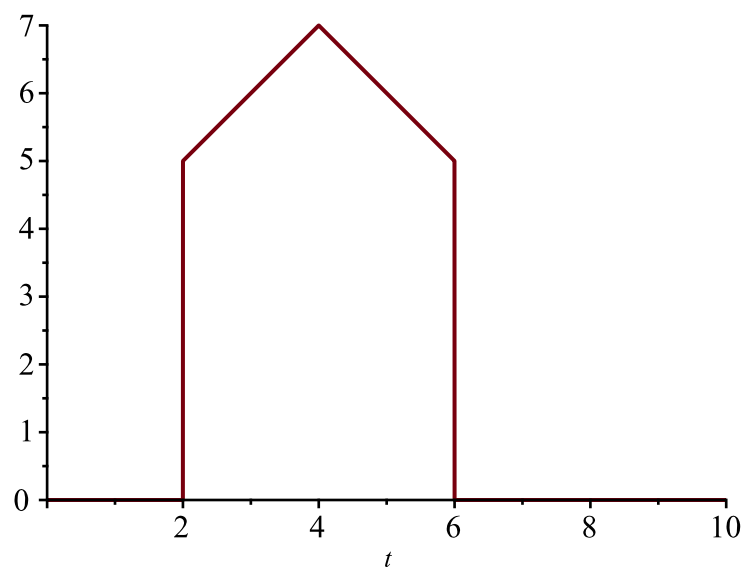
```
> TLimpulso := laplace(Dirac(t - 5), t, s)
```

$$TLimpulso := e^{-5s} \quad (21)$$

```
> restart
```

```
> f := 5·Heaviside(t - 2) + (t - 2) Heaviside(t - 2) - 2·(t - 4)·Heaviside(t - 4) + (t - 6)
·Heaviside(t - 6) - 5·Heaviside(t - 6); plot(f, t = 0..10, scaling = CONSTRAINED)
```

```
f := 5 Heaviside(t - 2) + (t - 2) Heaviside(t - 2) - 2 (t - 4) Heaviside(t - 4) + (t
- 6) Heaviside(t - 6) - 5 Heaviside(t - 6)
```



```
> with(inttrans) :
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```
> F := laplace(f, t, s)
```

$$F := \frac{-2 e^{-4 s} + (5 s + 1) e^{-2 s} - (-1 + 5 s) e^{-6 s}}{s^2}$$

(22)