```
> restart
> Ecua := y'''-4·y''=Q
```

$$Ecua := \frac{d^3}{dx^3} y(x) - 4 \frac{d^2}{dx^2} y(x) = Q \quad (1)$$

```
> SolPartNoHom := y(x) = exp(-4 x)
```

$$SolPartNoHom := y(x) = e^{-4x} \quad (2)$$

```
> Q := eval(subs(y(x) = rhs(SolPartNoHom), lhs(Ecua)))
```

$$Q := -128\, e^{-4x} \quad (3)$$

```
> SolGralHom := y(x) = _C1·exp(4 x) + _C2·x + _C3
```

$$SolGralHom := y(x) = \_C1\, e^{4x} + \_C2\, x + \_C3 \quad (4)$$

```
> SolGralNoHom := y(x) = rhs(SolGralHom) + rhs(SolPartNoHom)
```

$$SolGralNoHom := y(x) = \_C1\, e^{4x} + \_C2\, x + \_C3 + e^{-4x} \quad (5)$$

```
> Ecua
```

$$\frac{d^3}{dx^3} y(x) - 4 \frac{d^2}{dx^2} y(x) = -128\, e^{-4x} \quad (6)$$

```
> Comprobar := simplify(eval(subs(y(x) = rhs(SolGralNoHom), lhs(Ecua) - rhs(Ecua) = 0)))
```

$$Comprobar := 0 = 0 \quad (7)$$

```
> restart
> Ecua := t^2·diff(y(t), t$2) - 2·t·diff(y(t), t) + 2·y(t) = t·log(t)
```

$$Ecua := t^2 \left(\frac{d^2}{dt^2} y(t) \right) - 2t \left(\frac{d}{dt} y(t) \right) + 2\, y(t) = t \ln(t) \quad (8)$$

```
> EcuaDos := expand( lhs(Ecua) / t^2 ) = rhs(Ecua) / t^2
```

$$EcuaDos := \frac{d^2}{dt^2} y(t) - \frac{2 \left(\frac{d}{dt} y(t) \right)}{t} + \frac{2\, y(t)}{t^2} = \frac{\ln(t)}{t} \quad (9)$$

```
> yy[1] := t^2; yy[2] := t
```

$$yy_1 := t^2$$

$$yy_2 := t \quad (10)$$

```
> SolGralHom := y(t) = _C1·yy[1] + _C2·yy[2]
```

$$SolGralHom := y(t) = \_C1\, t^2 + \_C2\, t \quad (11)$$

```
> EcuaDosHom := lhs(EcuaDos) = 0
```

$$EcuaDosHom := \frac{d^2}{dt^2} y(t) - \frac{2 \left(\frac{d}{dt} y(t) \right)}{t} + \frac{2\, y(t)}{t^2} = 0 \quad (12)$$

```
> ComprobarUno := simplify(eval(subs(y(t) = rhs(SolGralHom), EcuaDosHom)))
```

$$ComprobarUno := 0 = 0 \quad (13)$$

```
> Q := rhs(EcuaDos)
```

$$Q := \frac{\ln(t)}{t} \tag{14}$$

```
> with(linalg) :
```

```
> WW := wronskian([yy[1], yy[2]], t)
```

$$WW := \begin{bmatrix} t^2 & t \\ 2\,t & 1 \end{bmatrix} \tag{15}$$

```
> BB := array([0, Q])
```

$$BB := \begin{bmatrix} 0 & \frac{\ln(t)}{t} \end{bmatrix} \tag{16}$$

```
> ParaVar := linsolve(WW, BB)
```

$$ParaVar := \begin{bmatrix} \frac{\ln(t)}{t^2} & -\frac{\ln(t)}{t} \end{bmatrix} \tag{17}$$

```
> Aprima := ParaVar[1]; Bprima := ParaVar[2]
```

$$Aprima := \frac{\ln(t)}{t^2}$$

$$Bprima := -\frac{\ln(t)}{t} \tag{18}$$

```
> SolPart := y(t) = simplify(int(Aprima, t)·yy[1] + int(Bprima, t)·yy[2])
```

$$SolPart := y(t) = t\left(-1 - \ln(t) - \frac{\ln(t)^2}{2}\right) \tag{19}$$

```
> SolGralNoHom := y(t) = rhs(SolGralHom) + rhs(SolPart)
```

$$SolGralNoHom := y(t) = \_C1\,t^2 + \_C2\,t + t\left(-1 - \ln(t) - \frac{\ln(t)^2}{2}\right) \tag{20}$$

```
> ComprobarDos := simplify(eval(subs(y(t) = rhs(SolGralNoHom), lhs(Ecua) - rhs(Ecua)
      = 0)))
```

$$ComprobarDos := 0 = 0 \tag{21}$$

```
> Ecua
```

$$t^2\left(\frac{d^2}{dt^2}\,y(t)\right) - 2\,t\left(\frac{d}{dt}\,y(t)\right) + 2\,y(t) = t\ln(t) \tag{22}$$

```
> restart
```

```
> Ecua := y' = sin(y)/(x·cos(y) - sin(y)^2)
```

$$Ecua := \frac{d}{dx}\,y(x) = \frac{\sin(y(x))}{x\cos(y(x)) - \sin(y(x))^2} \tag{23}$$

```
> EcuaDos := (x cos(y(x)) - sin(y(x))^2)·diff(y(x), x) - sin(y(x)) = 0
```

$$EcuaDos := \left(x\cos(y(x)) - \sin(y(x))^2\right)\left(\frac{d}{dx}\,y(x)\right) - \sin(y(x)) = 0 \tag{24}$$

```
> with(DEtools) :
```

```
> odeadvisor(EcuaDos)
```

$$[[\_1st\_order, \_with\_symmetry\_[F(x)*G(y),0]]] \quad (25)$$

```
> intfactor(EcuaDos)
```

$$\frac{1}{\sin(y(x))^2} \quad (26)$$

```
> IntFact := 1/sin(y)^2
```

$$IntFact := \frac{1}{\sin(y)^2} \quad (27)$$

```
> M := -sin(y)
```

$$M := -\sin(y) \quad (28)$$

```
> MM := IntFact·M
```

$$MM := -\frac{1}{\sin(y)} \quad (29)$$

```
> N := x*cos(y) - sin(y)^2
```

$$N := x\cos(y) - \sin(y)^2 \quad (30)$$

```
> NN := simplify(IntFact·N)
```

$$NN := x\cot(y)\csc(y) - 1 \quad (31)$$

```
> simplify(diff(MM, y) - diff(NN, x)) = 0
```

$$0 = 0 \quad (32)$$

```
>
>
```