```
> restart
> Ecuacion := y'''+y''+y'+y=0
```

$$Ecuacion := \frac{d^3}{dx^3} y(x) + \frac{d^2}{dx^2} y(x) + \frac{d}{dx} y(x) + y(x) = 0 \quad (1)$$

```
> SolucionGeneral := dsolve(Ecuacion)
```

$$SolucionGeneral := y(x) = \_C1\, e^{-x} + \_C2 \sin(x) + \_C3 \cos(x) \quad (2)$$

```
> with(linalg) :
> WS := wronskian([exp(-x), sin(x), cos(x)], x)
```

$$WS := \begin{bmatrix} e^{-x} & \sin(x) & \cos(x) \\ -e^{-x} & \cos(x) & -\sin(x) \\ e^{-x} & -\sin(x) & -\cos(x) \end{bmatrix} \quad (3)$$

```
> Prueba := det(WS) ≠ 0
```

$$Prueba := 2\, e^{-x} \left(-\cos(x)^2 - \sin(x)^2 \right) \neq 0 \quad (4)$$

```
> Comprobacion := eval(subs(y(x) = rhs(SolucionGeneral), Ecuacion))
```

$$Comprobacion := 0 = 0 \quad (5)$$

```
> CondicionesIniciales := y(0) = 5, D(y)(0) = -4, D(D(y))(0) = 9
```

$$CondicionesIniciales := y(0) = 5, D(y)(0) = -4, D^{(2)}(y)(0) = 9 \quad (6)$$

```
> EcuacionUno := simplify(subs(x = 0, rhs(SolucionGeneral) = rhs(CondicionesIniciales[1])))
```

$$EcuacionUno := \_C1 + \_C3 = 5 \quad (7)$$

```
> EcuacionDos := simplify(subs(x = 0, rhs(diff(SolucionGeneral, x))
    = rhs(CondicionesIniciales[2])))
```

$$EcuacionDos := -\_C1 + \_C2 = -4 \quad (8)$$

```
> EcuacionTres := simplify(subs(x = 0, rhs(diff(SolucionGeneral, x$2))
    = rhs(CondicionesIniciales[3])))
```

$$EcuacionTres := \_C1 - \_C3 = 9 \quad (9)$$

```
> Para := solve([EcuacionUno, EcuacionDos, EcuacionTres], [_C1, _C2, _C3])
```

$$Para := [[\_C1 = 7, \_C2 = 3, \_C3 = -2]] \quad (10)$$

```
> SolucionParticular := subs(_C1 = 7, _C2 = 3, _C3 = -2, SolucionGeneral)
```

$$SolucionParticular := y(x) = 7\, e^{-x} + 3 \sin(x) - 2 \cos(x) \quad (11)$$

```
> CondicionesIniciales
```

$$y(0) = 5, D(y)(0) = -4, D^{(2)}(y)(0) = 9 \quad (12)$$

```
> PrimeraCondicion := simplify(subs(x = 0, SolucionParticular))
```

$$PrimeraCondicion := y(0) = 5 \quad (13)$$

```
> SegundaCondicion := simplify(subs(x = 0, D(y)(0) = rhs(diff(SolucionParticular, x))))
```

$$SegundaCondicion := D(y)(0) = -4 \quad (14)$$

```
> TerceraCondicion := simplify(subs(x = 0, D(D(y))(0) = rhs(diff(SolucionParticular, x$2))))
```

$$TerceraCondicion := D^{(2)}(y)(0) = 9 \quad (15)$$

```
> ComprobarDos := simplify(eval(subs(y(x) = rhs(SolucionParticular), Ecuacion)))
```

$$ComprobarDos := 0 = 0 \quad (16)$$

```
> SolucionParticularDos := dsolve({Ecuacion, CondicionesIniciales})
```

$$SolucionParticularDos := y(x) = 7\, e^{-x} + 3 \sin(x) - 2 \cos(x) \quad (17)$$

> *SolucionParticular*

$$y(x) = 7\,e^{-x} + 3\,\sin(x) - 2\,\cos(x) \tag{18}$$

>