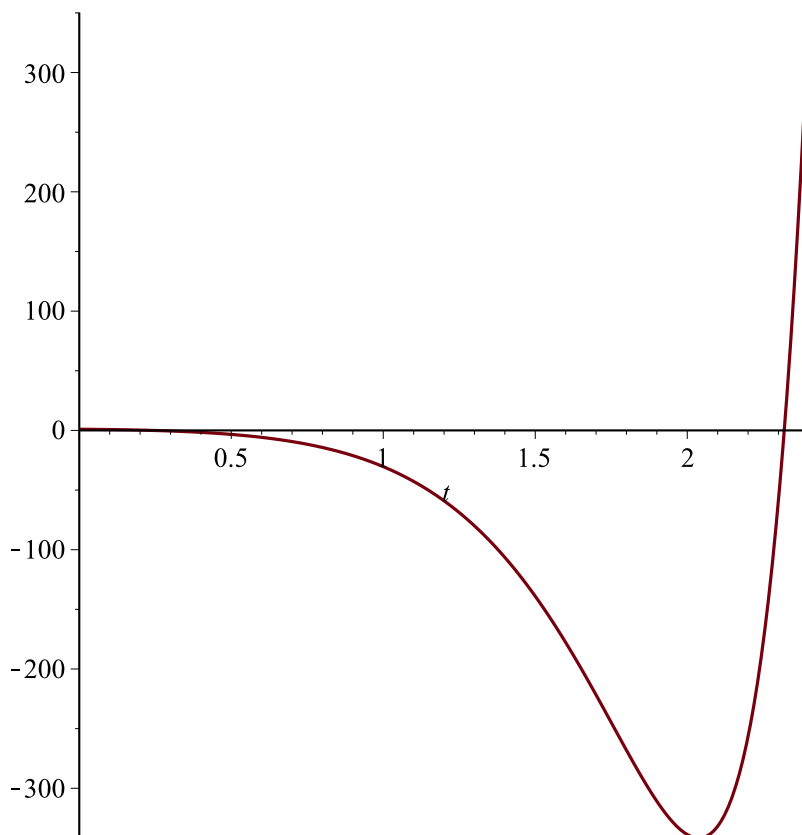


```

> restart
> Auno := A + D = 1; Ados := -6·A + B - 9·D + E = -11; Atres := 13·A - 3·B + C + 27·D - 9
  ·E = 36; Acuatro := -29·A + 4·B - 27·D + 27·E = -59; Acinco := 36·A - 12·B + 4·C
  - 27·E = 108
      Auno := A + D = 1
      Ados := -6 A + B - 9 D + E = -11
      Atres := 13 A - 3 B + C + 27 D - 9 E = 36
      Acuatro := -29 A + 4 B - 27 D + 27 E = -59
      Acinco := 36 A - 12 B + 4 C - 27 E = 108
(1)
> with(linalg) :
> Para := solve( {Auno, Ados, Atres, Acuatro, Acinco} )
      Para := { A = 936/1121, B = -4450/1121, C = 4443/1121, D = 185/1121, E = -600/1121 }
(2)
> restart
> Ecua := diff(y(t), t$2) - 6·diff(y(t), t) + 9·y(t) = 3·exp(3·t) + 5·cos(2·t)
      Ecua := d²/dt² y(t) - 6 (d/dt y(t)) + 9 y(t) = 3 e³ᵗ + 5 cos(2 t)
(3)
> CondIni := y(0) = 1, D(y)(0) = -2 plot(
      CondIni := y(0) = 1, D(y)(0) = -2
(4)
> with(inttrans) :
> EcuaTL := subs(CondIni, laplace(Ecua, t, s))
      EcuaTL := s² laplace(y(t), t, s) + 8 - s - 6 s laplace(y(t), t, s) + 9 laplace(y(t), t, s) = 3/(s-3)
      + 5 s/(s²+4)
(5)
> SolTL := simplify(isolate(EcuaTL, laplace(y(t), t, s)))
      SolTL := laplace(y(t), t, s) = (s⁴ - 11 s³ + 36 s² - 59 s + 108) / ((s-3)(s²+4)(s²-6s+9))
(6)
> SolPart := invlaplace(SolTL, s, t)
      SolPart := y(t) = 25/169 cos(2 t) - 60/169 sin(2 t) + 1/338 e³ᵗ (507 t² - 1300 t + 288)
(7)
> CondIni := y(0) = simplify(subs(t=0, rhs(SolPart)))
      CondIni := y(0) = 1
(8)
> CondIniDer := D(y)(0) = simplify(subs(t=0, rhs(diff(SolPart, t))))
      CondIniDer := D(y)(0) = -2
(9)
> plot(rhs(SolPart), t=0..2.4)

```



> restart

> EcuaSist := diff(x[1](t), t) = 2·x[1](t) + 3·x[2](t) + 4·t<sup>2</sup>, diff(x[2](t), t) = x[1](t) + 4·x[2](t) + 2·exp(3·t) : EcuaSist[1]; EcuaSist[2]

$$\frac{d}{dt} x_1(t) = 2x_1(t) + 3x_2(t) + 4t^2$$

$$\frac{d}{dt} x_2(t) = x_1(t) + 4x_2(t) + 2e^{3t} \quad (10)$$

> Ecua := diff(x[2](t), t\$2) - 6·diff(x[2](t), t) + 5·x[2](t) = 4·t<sup>2</sup> + 2·exp(3·t)

$$Ecua := \frac{d^2}{dt^2} x_2(t) - 6 \left( \frac{d}{dt} x_2(t) \right) + 5x_2(t) = 4t^2 + 2e^{3t} \quad (11)$$

> VarUno := x[1](t) = diff(x[2](t), t) - 4·x[2](t) - 2·exp(3·t)

$$VarUno := x_1(t) = \frac{d}{dt} x_2(t) - 4x_2(t) - 2e^{3t} \quad (12)$$

> SolGral[2] := dsolve(Ecua)

$$SolGral_2 := x_2(t) = e^t \_C2 + e^{5t} \_C1 - \frac{1}{2} e^{3t} + \frac{4}{5} t^2 + \frac{48}{25} t + \frac{248}{125} \quad (13)$$

> SolGral[1] := eval(subs(x[2](t) = rhs(SolGral[2]), VarUno))

$$SolGral_1 := x_1(t) = -3 e^t \_C2 + e^{5t} \_C1 - \frac{3}{2} e^{3t} - \frac{152}{25} t - \frac{752}{125} - \frac{16}{5} t^2 \quad (14)$$

> SolGral[2]

$$x_2(t) = e^t \_C2 + e^{5t} \_C1 - \frac{1}{2} e^{3t} + \frac{4}{5} t^2 + \frac{48}{25} t + \frac{248}{125} \quad (15)$$

> EcuaSist[1]; EcuaSist[2]

$$\begin{aligned} \frac{d}{dt} x_1(t) &= 2 x_1(t) + 3 x_2(t) + 4 t^2 \\ \frac{d}{dt} x_2(t) &= x_1(t) + 4 x_2(t) + 2 e^{3t} \end{aligned} \quad (16)$$

> Comprobar := simplify(eval(subs(x[1](t) = rhs(SolGral[1]), x[2](t) = rhs(SolGral[2]),  
lhs(EcuaSist[1]) - rhs(EcuaSist[1]) = 0)))

$$Comprobar := 0 = 0 \quad (17)$$

> ComprobarDos := simplify(eval(subs(x[1](t) = rhs(SolGral[1]), x[2](t) = rhs(SolGral[2]),  
lhs(EcuaSist[2]) - rhs(EcuaSist[2]) = 0)))

$$ComprobarDos := 0 = 0 \quad (18)$$

> with(linalg) :

> AA := array([ [2, 3], [1, 4] ])

$$AA := \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix} \quad (19)$$

> MatExp := exponential(AA, t)

$$MatExp := \begin{bmatrix} \frac{3}{4} e^t + \frac{1}{4} e^{5t} & \frac{3}{4} e^{5t} - \frac{3}{4} e^t \\ \frac{1}{4} e^{5t} - \frac{1}{4} e^t & \frac{1}{4} e^t + \frac{3}{4} e^{5t} \end{bmatrix} \quad (20)$$

> Identidad := map(rcurry(eval, t=0'), MatExp)

$$Identidad := \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad (21)$$

>