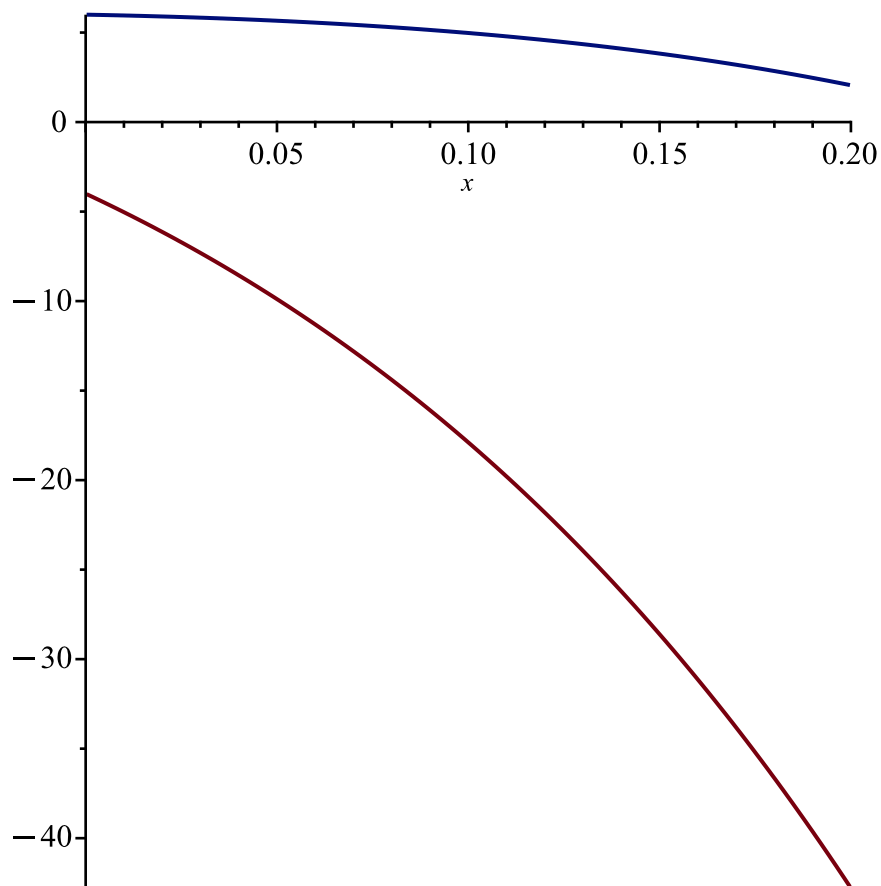


```

> restart
> Ecua := y'' - 7·y' + 12·y = 0
      Ecua :=  $\frac{d^2}{dx^2} y(x) - 7 \frac{d}{dx} y(x) + 12 y(x) = 0$  (1)
=
> EcuaCarac := m2 - 7·m + 12 = 0
      EcuaCarac :=  $m^2 - 7 m + 12 = 0$  (2)
=
> Para := solve(EcuaCarac)
      Para := 4, 3 (3)
=
> yy[1] := exp(Para[1]·x)
      yy1 := e4x (4)
=
> yy[2] := exp(Para[2]·x)
      yy2 := e3x (5)
=
> SolGral := y(x) = _C1·yy[1] + _C2·yy[2]
      SolGral :=  $y(x) = \_C1 e^{4x} + \_C2 e^{3x}$  (6)
=
> SolFinal := dsolve(Ecua)
      SolFinal :=  $y(x) = c_1 e^{4x} + c_2 e^{3x}$  (7)
=
> with(linalg) :
> WW := wronskian([yy[1], yy[2]], x)
      WW :=  $\begin{bmatrix} e^{4x} & e^{3x} \\ 4 e^{4x} & 3 e^{3x} \end{bmatrix}$  (8)
=
> Comprobar := det(WW) ≠ 0
      Comprobar :=  $-e^{4x} e^{3x} \neq 0$  (9)
=
> ComprobarDos := simplify(eval(subs(y(x) = rhs(SolGral), Ecua)))
      ComprobarDos := 0 = 0 (10)
=
> CondIni := y(0) = 6, D(y)(0) = -4
      CondIni :=  $y(0) = 6, D(y)(0) = -4$  (11)
=
> SolGral
       $y(x) = c_1 e^{4x} + c_2 e^{3x}$  (12)
=
> CondUno := simplify(subs(x = 0, rhs(SolGral) = 6))
      CondUno :=  $c_1 + c_2 = 6$  (13)
=
> CondDos := simplify(subs(x = 0, rhs(diff(SolGral, x)) = -4))
      CondDos :=  $4 c_1 + 3 c_2 = -4$  (14)
=
> Para := solve([CondUno, CondDos])
      Para := {c1 = -22, c2 = 28} (15)
=
> SolPart := subs(Para[1], Para[2], SolGral)
      SolPart :=  $y(x) = -22 e^{4x} + 28 e^{3x}$  (16)
=
> plot({rhs(SolPart), rhs(diff(SolPart, x))}, x = 0..0.2)

```



> restart

> Ecua := y'' + 2·y' + 2·y = 0

$$Ecua := \frac{d^2}{dx^2} y(x) + 2 \frac{d}{dx} y(x) + 2 y(x) = 0 \quad (17)$$

> EcuaCarac := m² + 2·m + 2 = 0

$$EcuaCarac := m^2 + 2 m + 2 = 0 \quad (18)$$

> Raiz := solve(EcuaCarac)

$$Raiz := -1 + I, -1 - I \quad (19)$$

> yy[1] := exp(Re(Raiz[1])·x)·cos(Im(Raiz[1])·x)

$$yy_1 := e^{-x} \cos(x) \quad (20)$$

> yy[2] := exp(Re(Raiz[1])·x)·sin(Im(Raiz[1])·x)

$$yy_2 := e^{-x} \sin(x) \quad (21)$$

> SolGral := y(x) = _C1·yy[1] + _C2·yy[2]

$$SolGral := y(x) = _C1 e^{-x} \cos(x) + _C2 e^{-x} \sin(x) \quad (22)$$

> with(linalg) :

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

$$WW := \begin{bmatrix} e^{-x} \cos(x) & e^{-x} \sin(x) \\ -e^{-x} \cos(x) - e^{-x} \sin(x) & -e^{-x} \sin(x) + e^{-x} \cos(x) \end{bmatrix} \quad (23)$$

$$\begin{aligned} &> \text{Comprobar} := \text{simplify}(\det(WW)) \neq 0 \\ &\qquad\qquad\qquad \text{Comprobar} := e^{-2x} \neq 0 \end{aligned} \tag{24}$$

$$\begin{aligned} &> \text{ComprobarDos} := \text{simplify}(\text{eval}(\text{subs}(y(x) = \text{rhs}(\text{SolGral}), \text{Ecua}))) \\ &\qquad\qquad\qquad \text{ComprobarDos} := 0 = 0 \end{aligned} \tag{25}$$

$$\begin{aligned} &> \text{CondIni} := y(0) = 10, D(y)(0) = -10 \\ &\qquad\qquad\qquad \text{CondIni} := y(0) = 10, D(y)(0) = -10 \end{aligned} \tag{26}$$

$$\begin{aligned} &> \text{EcuaUno} := \text{simplify}(\text{subs}(x=0, \text{rhs}(\text{SolGral}) = 10)) \\ &\qquad\qquad\qquad \text{EcuaUno} := _C1 = 10 \end{aligned} \tag{27}$$

$$\begin{aligned} &> \text{EcuaDos} := \text{simplify}(\text{subs}(x=0, \text{rhs}(\text{diff}(\text{SolGral}, x)) = -10)) \\ &\qquad\qquad\qquad \text{EcuaDos} := -_C1 + _C2 = -10 \end{aligned} \tag{28}$$

$$\begin{aligned} &> \text{Para} := \text{solve}([\text{EcuaUno}, \text{EcuaDos}]) \\ &\qquad\qquad\qquad \text{Para} := \{ _C1 = 10, _C2 = 0 \} \end{aligned} \tag{29}$$

$$\begin{aligned} &> \text{SolPart} := \text{subs}(\text{Para}[1], \text{Para}[2], \text{SolGral}) \\ &\qquad\qquad\qquad \text{SolPart} := y(x) = 10 e^{-x} \cos(x) \end{aligned} \tag{30}$$

$$> \text{plot}(\{ \text{rhs}(\text{SolPart}), \text{rhs}(\text{diff}(\text{SolPart}, x)) \}, x = 0..1)$$

