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> restart
> Ecua := x·y' + x = y
      Ecua := x ⎛  $\frac{d}{dx} y(x)$  ⎞ + x = y(x) (1)
> EcuaDos := simplify(  $\frac{lhs(Ecua)}{x}$  ) =  $\frac{rhs(Ecua)}{x}$ 
      EcuaDos :=  $\frac{d}{dx} y(x) + 1 = \frac{y(x)}{x}$  (2)
> EcuaTres := lhs(EcuaDos) - 1 - rhs(EcuaDos) = rhs(EcuaDos) - 1 - rhs(EcuaDos)
      EcuaTres :=  $\frac{d}{dx} y(x) - \frac{y(x)}{x} = -1$  (3)
> p := -  $\frac{1}{x}$ 
      p := -  $\frac{1}{x}$  (4)
> q := -1
      q := -1 (5)
> SolGral := y(x) = _C1·exp( -int(p, x) ) + exp( -int(p, x) )·int( exp(int(p, x))·q, x )
      SolGral := y(x) = _C1 x - x ln(x) (6)
> CondIni := y(1) = -1
      CondIni := y(1) = -1 (7)
> Parametro := simplify( isolate( subs(x=1, rhs(SolGral) = -1), _C1 ) )
      Parametro := _C1 = -1 (8)
> SolPart := subs( _C1 = rhs(Parametro), SolGral )
      SolPart := y(x) = -x - x ln(x) (9)
> Ecua
      x ⎛  $\frac{d}{dx} y(x)$  ⎞ + x = y(x) (10)
> ComprobarUno := simplify( eval( subs(y(x) = rhs(SolPart), lhs(Ecua) - rhs(Ecua) = 0 ) ) )
      ComprobarUno := 0 = 0 (11)
> ComprobarDos := simplify( subs(x=1, SolPart) )
      ComprobarDos := y(1) = -1 (12)
> restart
> SolGral := y(x) = _C1·x
      SolGral := y(x) = _C1 x (13)
> DerSolGral := diff( SolGral, x )
      DerSolGral :=  $\frac{d}{dx} y(x) = _C1$  (14)
> Ecua := subs( _C1 = lhs(DerSolGral), SolGral )
      Ecua := y(x) = ⎛  $\frac{d}{dx} y(x)$  ⎞ x (15)

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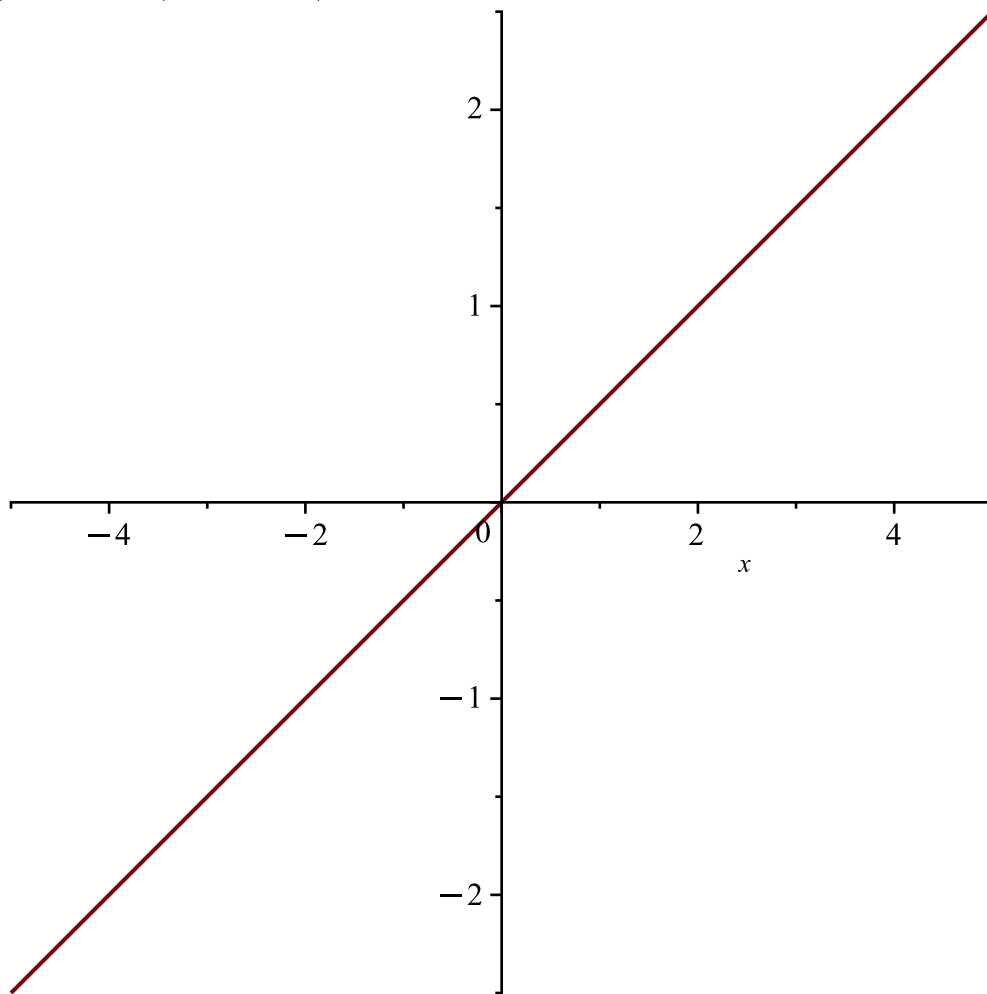
> ParaUno := isolate(subs(x=2, y(2)=1, SolGral), _C1)

$$\text{ParaUno} := _C1 = \frac{1}{2} \quad (16)$$

> SolPartUno := subs(_C1=rhs(ParaUno), SolGral)

$$\text{SolPartUno} := y(x) = \frac{x}{2} \quad (17)$$

> plot(rhs(SolPartUno), x=-5..5)



> restart

> SolGral := y(x) = $\frac{2 \cdot _C1 \cdot \exp(2x)}{1 + 2 \cdot _C1 \cdot \exp(2x)}$

$$\text{SolGral} := y(x) = \frac{2 _C1 e^{2x}}{1 + 2 _C1 e^{2x}} \quad (18)$$

> DerSolGral := diff(SolGral, x)

$$\text{DerSolGral} := \frac{d}{dx} y(x) = \frac{4 _C1 e^{2x}}{1 + 2 _C1 e^{2x}} - \frac{8 _C1^2 (e^{2x})^2}{(1 + 2 _C1 e^{2x})^2} \quad (19)$$

> Ecua := diff(y(x), x) = 2·y(x) - 2·y(x)²

$$\text{Ecua} := \frac{d}{dx} y(x) = 2 y(x) - 2 y(x)^2 \quad (20)$$

$$\begin{aligned} &> \text{Comprobar} := \text{simplify}(\text{eval}(\text{subs}(y(x) = \text{rhs}(\text{SolGral}), \text{lhs}(\text{Ecua}) - \text{rhs}(\text{Ecua}) = 0))) \\ &\quad \text{Comprobar} := 0 = 0 \end{aligned} \quad (21)$$

$$\begin{aligned} &> \text{Para} := \text{isolate}(\text{SolGral}, _C1) \\ &\quad \text{Para} := _C1 = -\frac{y(x)}{2 e^{2x} (y(x) - 1)} \end{aligned} \quad (22)$$

$$\begin{aligned} &> \text{EcuaDos} := \text{simplify}(\text{subs}(_C1 = \text{rhs}(\text{Para}), \text{DerSolGral})) \\ &\quad \text{EcuaDos} := \frac{d}{dx} y(x) = 2 y(x) - 2 y(x)^2 \end{aligned} \quad (23)$$

> restart

$$\begin{aligned} &> \text{Ecua} := y'' - 5 \cdot y' + 6 \cdot y = 0 \\ &\quad \text{Ecua} := \frac{d^2}{dx^2} y(x) - 5 \frac{d}{dx} y(x) + 6 y(x) = 0 \end{aligned} \quad (24)$$

$$\begin{aligned} &> \text{EcuaCarac} := m^2 - 5 \cdot m + 6 = 0 \\ &\quad \text{EcuaCarac} := m^2 - 5 m + 6 = 0 \end{aligned} \quad (25)$$

$$\begin{aligned} &> \text{Raiz} := \text{solve}(\text{EcuaCarac}) \\ &\quad \text{Raiz} := 3, 2 \end{aligned} \quad (26)$$

$$\begin{aligned} &> yy[1] := \exp(\text{Raiz}[1] \cdot x) \\ &\quad yy_1 := e^{3x} \end{aligned} \quad (27)$$

$$\begin{aligned} &> yy[2] := \exp(\text{Raiz}[2] \cdot x) \\ &\quad yy_2 := e^{2x} \end{aligned} \quad (28)$$

> with(linalg) :

$$\begin{aligned} &> WW := \text{wronskian}([yy[1], yy[2]], x) \\ &\quad WW := \begin{bmatrix} e^{3x} & e^{2x} \\ 3 e^{3x} & 2 e^{2x} \end{bmatrix} \end{aligned} \quad (29)$$

$$\begin{aligned} &> \det(WW) \neq 0 \\ &\quad -e^{3x} e^{2x} \neq 0 \end{aligned} \quad (30)$$

$$\begin{aligned} &> \text{SolGral} := y(x) = _C1 \cdot yy[1] + _C2 \cdot yy[2] \\ &\quad \text{SolGral} := y(x) = _C1 e^{3x} + _C2 e^{2x} \end{aligned} \quad (31)$$

$$\begin{aligned} &> \text{Comprobar} := \text{simplify}(\text{eval}(\text{subs}(y(x) = \text{rhs}(\text{SolGral}), \text{Ecua}))) \\ &\quad \text{Comprobar} := 0 = 0 \end{aligned} \quad (32)$$

> Ecua

$$\frac{d^2}{dx^2} y(x) - 5 \frac{d}{dx} y(x) + 6 y(x) = 0 \quad (33)$$

$$\begin{aligned} &> \text{CondIni} := y(0) = 5, D(y)(0) = -6 \\ &\quad \text{CondIni} := y(0) = 5, D(y)(0) = -6 \end{aligned} \quad (34)$$

> SolGral

$$y(x) = _C1 e^{3x} + _C2 e^{2x} \quad (35)$$

$$> \text{EcuaUno} := \text{simplify}(\text{subs}(x = 0, \text{rhs}(\text{SolGral}) = 5))$$

$$EcuaUno := _C1 + _C2 = 5 \quad (36)$$

$$\begin{aligned} &> EcuaDos := simplify(subs(x=0, rhs(diff(SolGral, x)) = -6)) \\ &EcuaDos := 3 _C1 + 2 _C2 = -6 \end{aligned} \quad (37)$$

$$\begin{aligned} &> Para := solve(\{EcuaUno, EcuaDos\}, \{_C1, _C2\}) \\ &Para := \{_C1 = -16, _C2 = 21\} \end{aligned} \quad (38)$$

$$\begin{aligned} &> SolPart := subs(_C1 = rhs(Para[1]), _C2 = rhs(Para[2]), SolGral) \\ &SolPart := y(x) = -16 e^{3x} + 21 e^{2x} \end{aligned} \quad (39)$$

$$\begin{aligned} &> SolPartDos := dsolve(\{CondIni, Ecua\}) \\ &SolPartDos := y(x) = -16 e^{3x} + 21 e^{2x} \end{aligned} \quad (40)$$

$$\begin{aligned} &> SolGralDos := dsolve(Ecua) \\ &SolGralDos := y(x) = c_1 e^{3x} + c_2 e^{2x} \end{aligned} \quad (41)$$

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