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> restart
> Ecua := 2·y·(y'+2) - x·(y')^2 = 0
      Ecua := 2 y(x) ⎛  $\frac{d}{dx} y(x) + 2$  ⎞ - x ⎛  $\frac{d}{dx} y(x)$  ⎞^2 = 0 (1)
> SolGral := y(x) =  $\frac{(C_1 - x)^2}{C_1}$ 
      SolGral := y(x) =  $\frac{(C_1 - x)^2}{C_1}$  (2)
> Comprobar := simplify(eval(subs(y(x) = rhs(SolGral), Ecua)))
      Comprobar := 0 = 0 (3)
> Dsolgral := diff(SolGral, x)
      Dsolgral :=  $\frac{d}{dx} y(x) = -\frac{2(C_1 - x)}{C_1}$  (4)
> Comp := (2·rhs(SolGral)·(rhs(Dsolgral) + 2) - x·(rhs(Dsolgral))^2) = 0
      Comp :=  $\frac{2(C_1 - x)^2 \left( -\frac{2(C_1 - x)}{C_1} + 2 \right)}{C_1} - \frac{4x(C_1 - x)^2}{C_1^2} = 0$  (5)
> SolPartUno := subs(C_1 = -8, SolGral)
      SolPartUno := y(x) =  $-\frac{(-8 - x)^2}{8}$  (6)
> SolPartDos := subs(C_1 = 5, SolGral)
      SolPartDos := y(x) =  $\frac{(5 - x)^2}{5}$  (7)
> SolPartTres := subs(C_1 = Pi, SolGral)
      SolPartTres := y(x) =  $\frac{(\pi - x)^2}{\pi}$  (8)
> SolPartCuatro := subs(C_1 = sqrt(3), SolGral)
      SolPartCuatro := y(x) =  $\frac{(\sqrt{3} - x)^2 \sqrt{3}}{3}$  (9)
> SolSingular := y(x) = -4·x
      SolSingular := y(x) = -4 x (10)
> ComprobarSingular := simplify(eval(subs(y(x) = rhs(SolSingular), Ecua)))
      ComprobarSingular := 0 = 0 (11)
> EcuaAlg := rhs(SolGral) = rhs(SolSingular)
      EcuaAlg :=  $\frac{(C_1 - x)^2}{C_1} = -4 x$  (12)
> Parametro := solve(EcuaAlg, C_1)
      Parametro := -x, -x (13)
> EcuaAlgDos := rhs(SolGral) = rhs(SolPartTres)

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$$EcuaAlgDos := \frac{(C_I - x)^2}{C_I} = \frac{(\pi - x)^2}{\pi} \quad (14)$$

> ParaDos := solve(EcuaAlgDos, C_I)

$$ParaDos := \pi, \frac{x^2}{\pi} \quad (15)$$

> SolSingularDos := y(x) = 0

$$SolSingularDos := y(x) = 0 \quad (16)$$

> ComprobarSingularDos := simplify(eval(subs(y(x) = rhs(SolSingularDos), Ecua)))

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

> Soluciones := dsolve(Ecua)

$$Soluciones := y(x) = -4x, y(x) = 0, y(x) = \frac{x(-x + 2c_I)^2}{2c_I^2 \left(-\frac{-x + 2c_I}{c_I} + 2 \right)} \quad (18)$$

> SolucionUno := Soluciones[1]

$$SolucionUno := y(x) = -4x \quad (19)$$

> SolucionDos := Soluciones[2]

$$SolucionDos := y(x) = 0 \quad (20)$$

> SolucionTres := simplify(Soluciones[3])

$$SolucionTres := y(x) = \frac{(x - 2c_I)^2}{2c_I} \quad (21)$$

> SolSingular

$$y(x) = -4x \quad (22)$$

> SolSingularDos

$$y(x) = 0 \quad (23)$$

> SolGral

$$y(x) = \frac{(C_I - x)^2}{C_I} \quad (24)$$

> restart

> Ecua := (1 + exp(x)) · y · y' = exp(x)

$$Ecua := (1 + e^x) y(x) \left(\frac{d}{dx} y(x) \right) = e^x \quad (25)$$

> with(DEtools) :

> odeadvisor(Ecua, y(x))

$$[_{separable}] \quad (26)$$

> M := -exp(x)

$$M := -e^x \quad (27)$$

> N := (1 + exp(x)) · y

$$N := (1 + e^x) y \quad (28)$$

$$\begin{aligned}
> P &:= \exp(x); Q := -1; R := 1 + \exp(x); S := y \\
&P := e^x \\
&Q := -1 \\
&R := 1 + e^x \\
&S := y
\end{aligned} \tag{29}$$

$$\begin{aligned}
> SolGral &:= \text{int}\left(\frac{P}{R}, x\right) + \text{int}\left(\frac{S}{Q}, y\right) = _C1 \\
&SolGral := \ln(1 + e^x) - \frac{y^2}{2} = _C1
\end{aligned} \tag{30}$$

$$\begin{aligned}
> SolGraDesp &:= \text{isolate}(SolGral, (1 + \exp(x))) \\
&SolGraDesp := 1 + e^x = e^{-_C1 + \frac{y^2}{2}}
\end{aligned} \tag{31}$$

$$\begin{aligned}
> SolFinal &:= (1 + \exp(x)) = _C10 \cdot \exp\left(\frac{y^2}{2}\right) \\
&SolFinal := 1 + e^x = _C10 e^{\frac{y^2}{2}}
\end{aligned} \tag{32}$$

$$\begin{aligned}
> Ecua \\
&(1 + e^x) y(x) \left(\frac{d}{dx} y(x) \right) = e^x
\end{aligned} \tag{33}$$

$$\begin{aligned}
> SolFinalDos &:= 1 + e^x = _C10 e^{\frac{y(x)^2}{2}} \\
&SolFinalDos := 1 + e^x = _C10 e^{\frac{y(x)^2}{2}}
\end{aligned} \tag{34}$$

$$\begin{aligned}
> DerSolFinalDos &:= \text{diff}(SolFinalDos, x) \\
&DerSolFinalDos := e^x = _C10 y(x) \left(\frac{d}{dx} y(x) \right) e^{\frac{y(x)^2}{2}}
\end{aligned} \tag{35}$$

$$\begin{aligned}
> DerderSolFinal &:= \text{simplify}(\text{isolate}(DerSolFinalDos, \text{diff}(y(x), x))) \\
&DerderSolFinal := \frac{d}{dx} y(x) = \frac{e^{x - \frac{y(x)^2}{2}}}{_C10 y(x)}
\end{aligned} \tag{36}$$

$$\begin{aligned}
> Para &:= \text{isolate}(SolFinalDos, _C10) \\
&Para := _C10 = -\frac{-1 - e^x}{e^{\frac{y(x)^2}{2}}}
\end{aligned} \tag{37}$$

$$\begin{aligned}
> DerSol &:= \text{simplify}(\text{subs}(_C10 = \text{rhs}(Para), DerderSolFinal)) \\
&DerSol := \frac{d}{dx} y(x) = \frac{e^x}{(1 + e^x) y(x)}
\end{aligned} \tag{38}$$

$$\begin{aligned}
> DerEcua &:= \text{isolate}(Ecua, \text{diff}(y(x), x)) \\
&DerEcua := \frac{d}{dx} y(x) = \frac{e^x}{(1 + e^x) y(x)}
\end{aligned} \tag{39}$$

|> *restart*
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