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> restart
> Ecua := y(x)·log(y(x)) + x·diff(y(x), x) = 0
      Ecua := y(x) ln(y(x)) + x ⎛⎜  $\frac{d}{dx}$  y(x) ⎟⎞ = 0 (1)
> M := y·log(y)
      M := y ln(y) (2)
> N := x
      N := x (3)
> P := 1; Q := y·log(y); R := x; S := 1
      P := 1
      Q := y ln(y)
      R := x
      S := 1 (4)
> SolGral := int⎛⎜  $\frac{P}{R}, x$  ⎟⎞ + int⎛⎜  $\frac{S}{Q}, y$  ⎟⎞ = C[1]
      SolGral := ln(x) + ln(ln(y)) = C1 (5)
> SolGralFinal := ln(x) + ln(ln(y(x))) = C1
      SolGralFinal := ln(x) + ln(ln(y(x))) = C1 (6)
>
> Ecua
      y(x) ln(y(x)) + x ⎛⎜  $\frac{d}{dx}$  y(x) ⎟⎞ = 0 (7)
> DerSolGralFinal := isolate(diff(SolGralFinal, x), diff(y(x), x))
      DerSolGralFinal :=  $\frac{d}{dx} y(x) = -\frac{y(x) \ln(y(x))}{x}$  (8)
> DerEcua := isolate(Ecua, diff(y(x), x))
      DerEcua :=  $\frac{d}{dx} y(x) = -\frac{y(x) \ln(y(x))}{x}$  (9)
> SolSol := dsolve(Ecua)
      SolSol := y(x) = e $\frac{1}{xc}$  (10)
> restart
> Ecua := -(sqrt(x2 - y2) + y) + x·y' = 0
      Ecua :=  $-\sqrt{x^2 - y(x)^2} - y(x) + x \left( \frac{d}{dx} y(x) \right) = 0$  (11)
> with(DEtools):
> odeadvisor(Ecua)
      [[_homogeneous, class A], _rational, _dAlembert] (12)
> EcuaDos := simplify(eval(subs(y(x) = x·u(x), Ecua)))

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$$EcuaDos := \left(\frac{d}{dx} u(x) \right) x^2 - \sqrt{x^2 (1 - u(x)^2)} = 0 \quad (13)$$

$$\begin{aligned} &> P := -x; Q := \text{sqrt}(1 - u^2); R := x^2; S := 1 \\ &\quad P := -x \\ &\quad Q := \sqrt{-u^2 + 1} \\ &\quad R := x^2 \\ &\quad S := 1 \end{aligned} \quad (14)$$

$$\begin{aligned} &> SolPreliminar := \text{int}\left(\frac{P}{R}, x\right) + \text{int}\left(\frac{S}{Q}, u\right) = C \\ &\quad SolPreliminar := -\ln(x) + \arcsin(u) = C \end{aligned} \quad (15)$$

$$\begin{aligned} &> SolFinal := -\log(x) + \arcsin\left(\frac{y(x)}{x}\right) = C \\ &\quad SolFinal := -\ln(x) + \arcsin\left(\frac{y(x)}{x}\right) = C \end{aligned} \quad (16)$$

$$\begin{aligned} &> Ecua \\ &\quad -\sqrt{x^2 - y(x)^2} - y(x) + x \left(\frac{d}{dx} y(x) \right) = 0 \end{aligned} \quad (17)$$

$$\begin{aligned} &> DerSolFinal := \text{simplify}(\text{isolate}(\text{diff}(SolFinal, x), \text{diff}(y(x), x))) \\ &\quad DerSolFinal := \frac{d}{dx} y(x) = \frac{\sqrt{\frac{x^2 - y(x)^2}{x^2}} x + y(x)}{x} \end{aligned} \quad (18)$$

$$\begin{aligned} &> DerEcua := \text{isolate}(Ecua, \text{diff}(y(x), x)) \\ &\quad DerEcua := \frac{d}{dx} y(x) = \frac{\sqrt{x^2 - y(x)^2} + y(x)}{x} \end{aligned} \quad (19)$$

$$\begin{aligned} &> \\ &> DerSolFinal := \text{diff}(y(x), x) = \frac{\sqrt{x^2 - y(x)^2} + y(x)}{x} \\ &\quad DerSolFinal := \frac{d}{dx} y(x) = \frac{\sqrt{x^2 - y(x)^2} + y(x)}{x} \end{aligned} \quad (20)$$

$$\begin{aligned} &> Comprobar := \text{rhs}(DerSolFinal) - \text{rhs}(DerEcua) = 0 \\ &\quad Comprobar := 0 = 0 \end{aligned} \quad (21)$$

$$\begin{aligned} &> restart \\ &> \text{int}\left(\frac{(1 - u + 4 \cdot u^2)}{(4 + 4 \cdot u^3)}, u\right) \\ &\quad \frac{\ln(u + 1)}{2} + \frac{\ln(u^2 - u + 1)}{4} \end{aligned} \quad (22)$$

$$\begin{aligned} &> restart \\ &> Ecua := (4 \cdot x^2 - x \cdot y + y^2) + (x^2 - x \cdot y + 4 \cdot y^2) \cdot y' = 0 \end{aligned}$$

$$Ecua := 4x^2 - xy(x) + y(x)^2 + (x^2 - xy(x) + 4y(x)^2) \left(\frac{d}{dx} y(x) \right) = 0 \quad (23)$$

> with(DEtools) :

$$\text{odeadvisor}(Ecua) \quad [[_{homogeneous}, class A], _{rational}, _{dAlembert}] \quad (24)$$

> EcuaDos := expand(eval(subs(y(x) = x·u(x), Ecua)))

$$EcuaDos := 4x^2 + x^3 \left(\frac{d}{dx} u(x) \right) - x^3 u(x) \left(\frac{d}{dx} u(x) \right) + 4x^2 u(x)^3 + 4x^3 u(x)^2 \left(\frac{d}{dx} u(x) \right) = 0 \quad (25)$$

> odeadvisor(EcuaDos)

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

> EcuaTres := simplify(isolate(EcuaDos, diff(u(x), x)))

$$EcuaTres := \frac{d}{dx} u(x) = \frac{-4 - 4u(x)^3}{x(1 + 4u(x)^2 - u(x))} \quad (27)$$

> M := -(-4 - 4u^3)

$$M := 4u^3 + 4 \quad (28)$$

> N := x(1 + 4u^2 - u)

$$N := x(4u^2 - u + 1) \quad (29)$$

> P := 1; Q := M; R := x; S := \frac{N}{x}

$$P := 1$$

$$Q := 4u^3 + 4$$

$$R := x$$

$$S := 4u^2 - u + 1 \quad (30)$$

> SolGral := int\left(\frac{P}{R}, x\right) + int\left(\frac{S}{Q}, u\right) = C

$$SolGral := \ln(x) + \frac{\ln(u^2 - u + 1)}{4} + \frac{\ln(u + 1)}{2} = C \quad (31)$$

> SolFinal := simplify\left(subs\left(u = \frac{y(x)}{x}, SolGral\right)\right)

$$SolFinal := \ln(x) + \frac{\ln\left(\frac{y(x)^2 - xy(x) + x^2}{x^2}\right)}{4} + \frac{\ln\left(\frac{y(x) + x}{x}\right)}{2} = C \quad (32)$$

> DerSolFinal := simplify(isolate(diff(SolFinal, x), diff(y(x), x)))

$$DerSolFinal := \frac{d}{dx} y(x) = \frac{-4x^2 + xy(x) - y(x)^2}{x^2 - xy(x) + 4y(x)^2} \quad (33)$$

> DerEcua := isolate(Ecua, diff(y(x), x))

$$(34)$$

$$DerEcua := \frac{d}{dx} y(x) = \frac{-4x^2 + xy(x) - y(x)^2}{x^2 - xy(x) + 4y(x)^2} \quad (34)$$

$$\begin{aligned} &> Comprobar := simplify(rhs(DerSolFinal) - rhs(DerEcua)) = 0 \\ &Comprobar := 0 = 0 \end{aligned} \quad (35)$$

> restart

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