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> restart
> Ecua := (3·x2·y2 + 16·x·y3 + 32·x·y2) + (2·x3·y + 24·x2·y2 + 32·x2·y)·y'=0
Ecua := 3 x2 y(x)2 + 16 x y(x)3 + 32 x y(x)2 + (2 x3 y(x) + 24 x2 y(x)2 + 32 x2 y(x)) ( d/dx
y(x) ) = 0 (1)

> with(DEtools):
> odeadvisor(Ecua)
[_exact, _rational, [_Abel, 2nd type, class B]] (2)

> M := 3·x2·y2 + 16·x·y3 + 32·x·y2
M := 3 x2 y2 + 16 x y3 + 32 x y2 (3)

> N := 2·x3·y + 24·x2·y2 + 32·x2·y
N := 2 x3 y + 24 x2 y2 + 32 x2 y (4)

> DerMy := diff(M, y)
DerMy := 6 x2 y + 48 x y2 + 64 y x (5)

> DerNx := diff(N, x)
DerNx := 6 x2 y + 48 x y2 + 64 y x (6)

> IntMx := expand(int(M, x))
IntMx := x3 y2 + 8 x2 y3 + 16 x2 y2 (7)

> IntNmenos := int((N - diff(IntMx, y)), y)
IntNmenos := 0 (8)

> SolGral := IntMx + IntNmenos = C[1]
SolGral := x3 y2 + 8 x2 y3 + 16 x2 y2 = C1 (9)

> IntNy := expand(int(N, y))
IntNy := x3 y2 + 8 x2 y3 + 16 x2 y2 (10)

> IntMmenos := simplify(int((M - diff(IntNy, x)), x))
IntMmenos := 0 (11)

> SolGralDos := IntNy + IntMmenos = C[2]
SolGralDos := x3 y2 + 8 x2 y3 + 16 x2 y2 = C2 (12)

> restart
> Ecua := ( x/sqrt(x2 + y2) + 1/x + 1/y ) + ( y/sqrt(x2 + y2) + 1/y - x/y2 )·y'=0
Ecua := x/sqrt(x2 + y(x)2) + 1/x + 1/y(x) + ( y(x)/sqrt(x2 + y(x)2) + 1/y(x) - x/y(x)2 ) ( d/dx y(x) ) = 0 (13)

> with(DEtools):
> odeadvisor(Ecua)
[_exact] (14)

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$$\begin{aligned} > M := \frac{x}{\text{sqrt}(x^2 + y^2)} + \frac{1}{x} + \frac{1}{y} \\ & \quad M := \frac{x}{\sqrt{x^2 + y^2}} + \frac{1}{x} + \frac{1}{y} \end{aligned} \quad (15)$$

$$\begin{aligned} > N := \frac{y}{\text{sqrt}(x^2 + y^2)} + \frac{1}{y} - \frac{x}{y^2} \\ & \quad N := \frac{y}{\sqrt{x^2 + y^2}} + \frac{1}{y} - \frac{x}{y^2} \end{aligned} \quad (16)$$

$$\begin{aligned} > \text{IntMx} := \text{int}(M, x) \\ & \quad \text{IntMx} := \ln(x) + \frac{x}{y} + \sqrt{x^2 + y^2} \end{aligned} \quad (17)$$

$$\begin{aligned} > \text{SolGralUno} := \text{IntMx} + \text{int}((N - \text{diff}(\text{IntMx}, y)), y) = C[1] \\ & \quad \text{SolGralUno} := \ln(x) + \frac{x}{y} + \sqrt{x^2 + y^2} + \ln(y) = C_1 \end{aligned} \quad (18)$$

$$\begin{aligned} > \text{IntNy} := \text{int}(N, y) \\ & \quad \text{IntNy} := \ln(y) + \sqrt{x^2 + y^2} + \frac{x}{y} \end{aligned} \quad (19)$$

$$\begin{aligned} > \text{SolGralDos} := \text{IntNy} + \text{int}((M - \text{diff}(\text{IntNy}, x)), x) = C[2] \\ & \quad \text{SolGralDos} := \ln(x) + \frac{x}{y} + \sqrt{x^2 + y^2} + \ln(y) = C_2 \end{aligned} \quad (20)$$

$$\begin{aligned} > \text{SolFinal} := \ln(x) + \frac{x}{y(x)} + \sqrt{x^2 + y(x)^2} + \ln(y(x)) = C_2 \\ & \quad \text{SolFinal} := \ln(x) + \frac{x}{y(x)} + \sqrt{x^2 + y(x)^2} + \ln(y(x)) = C_2 \end{aligned} \quad (21)$$

$$\begin{aligned} > \text{Ecua} \\ & \quad \frac{x}{\sqrt{x^2 + y(x)^2}} + \frac{1}{x} + \frac{1}{y(x)} + \left(\frac{y(x)}{\sqrt{x^2 + y(x)^2}} + \frac{1}{y(x)} - \frac{x}{y(x)^2} \right) \left(\frac{d}{dx} y(x) \right) = 0 \end{aligned} \quad (22)$$

$$\begin{aligned} > \text{DerSolFinal} := \text{simplify}(\text{isolate}(\text{diff}(\text{SolFinal}, x), \text{diff}(y(x), x))) \\ & \quad \text{DerSolFinal} := \frac{d}{dx} y(x) = \frac{((y(x) + x) \sqrt{x^2 + y(x)^2} + y(x) x^2) y(x)}{x ((-y(x) + x) \sqrt{x^2 + y(x)^2} - y(x)^3)} \end{aligned} \quad (23)$$

$$\begin{aligned} > \text{DerEcua} := \text{simplify}(\text{isolate}(\text{Ecua}, \text{diff}(y(x), x))) \\ & \quad \text{DerEcua} := \frac{d}{dx} y(x) = \frac{((y(x) + x) \sqrt{x^2 + y(x)^2} + y(x) x^2) y(x)}{x ((-y(x) + x) \sqrt{x^2 + y(x)^2} - y(x)^3)} \end{aligned} \quad (24)$$

$$\begin{aligned} > \text{Comprobar} := \text{simplify}(\text{rhs}(\text{DerSolFinal}) - \text{rhs}(\text{DerEcua})) = 0 \\ & \quad \text{Comprobar} := 0 = 0 \end{aligned} \quad (25)$$

> restart

$$\begin{aligned} > \text{EcuaNueva} := (3 \cdot x \cdot y^2 + 16 \cdot y^3 + 32 \cdot y^2) + (2 \cdot x^2 \cdot y + 24 \cdot x \cdot y^2 + 32 \cdot x \cdot y) \cdot y' = 0 \end{aligned} \quad (26)$$

$$EcuaNueva := 3xy(x)^2 + 16y(x)^3 + 32y(x)^2 + (2x^2y(x) + 24xy(x)^2 + 32xy(x)) \left(\frac{d}{dx} y(x) \right) = 0 \quad (26)$$

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> with(DEtools):
> odeadvisor(EcuaNueva)
[_rational, [_Abel, 2nd type, class B]] (27)
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> intfactor(EcuaNueva)
x (28)
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```
> MM := (3·x·y^2 + 16·y^3 + 32·y^2)
MM := 3xy^2 + 16y^3 + 32y^2 (29)
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> NN := (2·x^2·y + 24·x·y^2 + 32·x·y)
NN := 2x^2y + 24xy^2 + 32xy (30)
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> DerMMMy := diff(MM, y)
DerMMMy := 6xy + 48y^2 + 64y (31)
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```
> DerNNx := diff(NN, x)
DerNNx := 4xy + 24y^2 + 32y (32)
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```
> EcuaMu := diff(mu(x), x) / mu(x) = simplify((DerMMMy - DerNNx) / NN)
EcuaMu := (d/dx mu(x)) / mu(x) = 1/x (33)
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```
> FactorIntegrante := isolate(int(1/mu, mu) = int(rhs(EcuaMu), x), mu)
FactorIntegrante := mu = x (34)
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```
> MMM := rhs(FactorIntegrante)·MM
MMM := x(3xy^2 + 16y^3 + 32y^2) (35)
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```
> NNN := rhs(FactorIntegrante)·NN
NNN := x(2x^2y + 24xy^2 + 32xy) (36)
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```
> expand(diff(MMM, y) = diff(NNN, x))
6x^2y + 48xy^2 + 64xy = 6x^2y + 48xy^2 + 64xy (37)
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