> *restart*

> $Ecuacion := 3 \cdot \exp(x) \cdot \tan(y(x)) + (2 - \exp(x)) \cdot (\sec(y(x)))^2 \cdot \text{diff}(y(x), x) = 0$

$$Ecuacion := 3\,e^x \tan(y(x)) + (2 - e^x)\sec(y(x))^2 \left(\frac{d}{dx}\,y(x)\right) = 0 \tag{1}$$

> $M(x, y) := 3\,e^x \tan(y)$

$$M(x, y) := 3\,e^x \tan(y) \tag{2}$$

> $N(x, y) := (2 - e^x)\sec(y)^2$

$$N(x, y) := (2 - e^x)\sec(y)^2 \tag{3}$$

> $with(DEtools):$
> $odeadvisor(Ecuacion)$

$$[\_separable] \tag{4}$$

> $P(x) := 3 \cdot \exp(x);\; Q(y) := \tan(y);\; R(x) := 2 - \exp(x);\; S(y) := \sec(y)^2$

$$P(x) := 3\,e^x$$
$$Q(y) := \tan(y)$$
$$R(x) := 2 - e^x$$
$$S(y) := \sec(y)^2 \tag{5}$$

> $SolucionGeneral := int\left(\dfrac{P(x)}{R(x)}, x\right) + int\left(\dfrac{S(y)}{Q(y)}, y\right) = \_C1$

$$SolucionGeneral := -3\ln(2 - e^x) + \ln(\tan(y)) = \_C1 \tag{6}$$

> $SolGralComprobacion := -3\ln(2 - e^x) + \ln(\tan(y(x))) = \_C1$

$$SolGralComprobacion := -3\ln(2 - e^x) + \ln(\tan(y(x))) = \_C1 \tag{7}$$

> *Ecuacion*

$$3\,e^x \tan(y(x)) + (2 - e^x)\sec(y(x))^2 \left(\frac{d}{dx}\,y(x)\right) = 0 \tag{8}$$

> $DerSolGral := simplify(isolate(diff(SolGralComprobacion, x), diff(y(x), x)))$

$$DerSolGral := \frac{d}{dx}\,y(x) = \frac{3\,e^x \cos(y(x))\sin(y(x))}{-2 + e^x} \tag{9}$$

> $DerEcuacion := simplify(isolate(Ecuacion, diff(y(x), x)))$

$$DerEcuacion := \frac{d}{dx}\,y(x) = \frac{3\,e^x \cos(y(x))\sin(y(x))}{-2 + e^x} \tag{10}$$

> *restart*

> $Ecuacion := 4 \cdot x^2 + x \cdot y(x) - 3 \cdot y(x)^2 + (-5 \cdot x^2 + 2 \cdot x \cdot y(x) + y(x)^2) \cdot diff(y(x), x) = 0$

$$Ecuacion := 4x^2 + x\,y(x) - 3\,y(x)^2 + (-5x^2 + 2x\,y(x) + y(x)^2)\left(\frac{d}{dx}\,y(x)\right) = 0 \tag{11}$$

> $with(DEtools):$
> $odeadvisor(Ecuacion)$

$$[[\_homogeneous, class\ A], \_rational, \_dAlembert] \tag{12}$$

> $EcuacionDos := subs(y(x) = x \cdot u(x), Ecuacion)$

$$EcuacionDos := 4x^2 + x^2 u(x) - 3x^2 u(x)^2 + (-5x^2 + 2x^2 u(x) + x^2 u(x)^2)\left(\frac{d}{dx}\,(x\,u(x))\right) \tag{13}$$
$$= 0$$

> $EcuacionTres := simplify(isolate(EcuacionDos, diff(u(x), x)))$

$$EcuacionTres := \frac{d}{dx}\, u(x) = -\frac{u(x)^3 - u(x)^2 - 4\,u(x) + 4}{x\left(u(x)^2 + 2\,u(x) - 5\right)} \qquad (14)$$

> $odeadvisor(EcuacionTres)$

$$[\_separable] \qquad (15)$$

> $P(u) := -\dfrac{u^3 - u^2 - 4\,u + 4}{\left(u^2 + 2\,u - 5\right)}$

$$P(u) := -\frac{u^3 - u^2 - 4\,u + 4}{u^2 + 2\,u - 5} \qquad (16)$$

> $SolucionGeneralUno := int\left(\dfrac{1}{P(u)}, u\right) = int\left(\dfrac{1}{x}, x\right) + \_C1$

$$SolucionGeneralUno := -\frac{3}{4}\ln(u-2) + \frac{5}{12}\ln(u+2) - \frac{2}{3}\ln(u-1) = \ln(x) + \_C1 \qquad (17)$$

> $SolucionGeneralDos := isolate(SolucionGeneralUno, \_C1)$

$$SolucionGeneralDos := \_C1 = -\frac{3}{4}\ln(u-2) + \frac{5}{12}\ln(u+2) - \frac{2}{3}\ln(u-1) - \ln(x) \qquad (18)$$

> $SolucionGeneralTres := simplify(exp(rhs(SolucionGeneralDos))) = \_C1$

$$SolucionGeneralTres := \frac{(u+2)^{5/12}}{(u-2)^{3/4}(u-1)^{2/3}\,x} = \_C1 \qquad (19)$$

> $SolucionGeneralCuatro := subs\left(u = \dfrac{y(x)}{x}, SolucionGeneralTres\right)$

$$SolucionGeneralCuatro := \frac{\left(\dfrac{y(x)}{x} + 2\right)^{5/12}}{\left(\dfrac{y(x)}{x} - 2\right)^{3/4}\left(\dfrac{y(x)}{x} - 1\right)^{2/3}\,x} = \_C1 \qquad (20)$$

> $Ecuacion$

$$4\,x^2 + x\,y(x) - 3\,y(x)^2 + \left(-5\,x^2 + 2\,x\,y(x) + y(x)^2\right)\left(\frac{d}{dx}\,y(x)\right) = 0 \qquad (21)$$

> $restart$

> $Ecuacion := x + y(x)^2 - 2\cdot x\cdot y(x)\cdot diff(y(x), x) = 0$

$$Ecuacion := x + y(x)^2 - 2\,x\,y(x)\left(\frac{d}{dx}\,y(x)\right) = 0 \qquad (22)$$

> $with(DEtools):$

> $odeadvisor(Ecuacion)$

$$[[\_homogeneous,\ class\ G],\ \_rational,\ \_Bernoulli] \qquad (23)$$

> $M(x, y) := x + y^2$

$$M(x, y) := y^2 + x \qquad (24)$$

> $N(x, y) := -2\,x\,y$

$$N(x, y) := -2\,x\,y \qquad (25)$$

> $comprobacion := diff(M(x, y), y) \neq diff(N(x, y), x)$

$$comprobacion := 2\,y \neq -2\,y \qquad (26)$$

NO ES EXACTA

> $f(x) := \dfrac{(diff(M(x,y), y) - diff(N(x,y), x))}{N(x,y)}$

$$f(x) := -\frac{2}{x} \tag{27}$$

el factor integrante sí es función solo de "x"

> $EcuaFacInt := Int\left(\dfrac{1}{mu}, mu\right) = Int(f(x), x)$

$$EcuaFacInt := \int \frac{1}{\mu}\, d\mu = \int \left(-\frac{2}{x}\right) dx \tag{28}$$

> $FacInt := isolate\left(int\left(\dfrac{1}{mu}, mu\right) = int(f(x), x), mu\right)$

$$FacInt := \mu = \frac{1}{x^2} \tag{29}$$

> $EcuacionExacta := expand(rhs(FacInt) \cdot Ecuacion)$

$$EcuacionExacta := \frac{1}{x} + \frac{y(x)^2}{x^2} - \frac{2\,y(x)\left(\dfrac{d}{dx}\,y(x)\right)}{x} = 0 \tag{30}$$

> $MM(x,y) := \dfrac{1}{x} + \dfrac{y^2}{x^2}$

$$MM(x,y) := \frac{1}{x} + \frac{y^2}{x^2} \tag{31}$$

> $NN(x,y) := -\dfrac{2y}{x}$

$$NN(x,y) := -\frac{2y}{x} \tag{32}$$

> $ComprobDos := diff(MM(x,y), y) = diff(NN(x,y), x)$

$$ComprobDos := \frac{2y}{x^2} = \frac{2y}{x^2} \tag{33}$$

por lo tanto la nueva ecuación es exacta

> $IntMMx := int(MM(x,y), x)$

$$IntMMx := \ln(x) - \frac{y^2}{x} \tag{34}$$

> $SolucionGeneral := IntMMx + int((NN(x,y) - diff(IntMMx, y)), y) = \_C1$

$$SolucionGeneral := \ln(x) - \frac{y^2}{x} = \_C1 \tag{35}$$

> $SolucionGeneralDos := \ln(x) - \dfrac{y(x)^2}{x} = \_C1$

$$SolucionGeneralDos := \ln(x) - \frac{y(x)^2}{x} = \_C1 \tag{36}$$

> $restart$

>

>