> *restart*

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

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

> $M := factor\left(x^2 - y \cdot x^2\right)$

$$M := -x^2\,(y-1) \tag{2}$$

> $N := factor\left(y^2 + x \cdot y^2\right)$

$$N := y^2\,(x+1) \tag{3}$$

> *with(DEtools)*

$[AreSimilar, Closure, DEnormal, DEplot, DEplot3d, DEplot\_polygon, DFactor,$ (4)
    DFactorLCLM, DFactorsols, Dchangevar, Desingularize, FunctionDecomposition, GCRD,
    Gosper, Heunsols, Homomorphisms, IVPsol, IsHyperexponential, LCLM, MeijerGsols,
    MultiplicativeDecomposition, ODEInvariants, PDEchangecoords, PolynomialNormalForm,
    RationalCanonicalForm, ReduceHyperexp, RiemannPsols, Xchange, Xcommutator, Xgauge,
    Zeilberger, abelsol, adjoint, autonomous, bernoullisol, buildsol, buildsym, canoni, caseplot,
    casesplit, checkrank, chinisol, clairautsol, constcoeffsols, convertAlg, convertsys,
    dalembertsol, dcoeffs, de2diffop, dfieldplot, diff_table, diffop2de, dperiodic_sols, dpolyform,
    dsubs, eigenring, endomorphism_charpoly, equinv, eta_k, eulersols, exactsol, expsols,
    exterior_power, firint, firtest, formal_sol, gen_exp, generate_ic, genhomosol, gensys,
    hamilton_eqs, hypergeomsols, hyperode, indicialeq, infgen, initialdata, integrate_sols,
    intfactor, invariants, kovacicsols, leftdivision, liesol, line_int, linearsol, matrixDE,
    matrix_riccati, maxdimsystems, moser_reduce, muchange, mult, mutest, newton_polygon,
    normalG2, ode_int_y, ode_y1, odeadvisor, odepde, parametricsol, particularsol,
    phaseportrait, poincare, polysols, power_equivalent, rational_equivalent, ratsols, redode,
    reduceOrder, reduce_order, regular_parts, regularsp, remove_RootOf, riccati_system,
    riccatisol, rifread, rifsimp, rightdivision, rtaylor, separablesol, singularities, solve_group,
    super_reduce, symgen, symmetric_power, symmetric_product, symtest, transinv, translate,
    untranslate, varparam, zoom]

> *odeadvisor(Ecua)*

$$[\_separable] \tag{5}$$

> $P := -x^2; Q := (y-1); R := x+1; S := y^2$

$$P := -x^2$$
$$Q := y - 1$$
$$R := x + 1$$
$$S := y^2 \tag{6}$$

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

$$SolucionGeneral := -\frac{1}{2}\, x^2 + x - \ln(x+1) + \frac{1}{2}\, y^2 + y + \ln(y-1) = \_C1 \tag{7}$$

> $SolGral := -\frac{1}{2}\, x^2 + x - \ln(x+1) + \frac{1}{2}\, y(x)^2 + y(x) + \ln(y(x)-1) = \_C1$

$$\tag{8}$$

$$SolGral := -\frac{1}{2}\,x^2 + x - \ln(x+1) + \frac{1}{2}\,y(x)^2 + y(x) + \ln(y(x)-1) = \_C1 \tag{8}$$

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

$$DerSolGral := \frac{d}{dx}\,y(x) = \frac{x^2\,(y(x)-1)}{(x+1)\,y(x)^2} \tag{9}$$

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

$$DerEcua := \frac{d}{dx}\,y(x) = \frac{-x^2 + y(x)\,x^2}{y(x)^2 + x\,y(x)^2} \tag{10}$$

> $Comprobar := simplify(rhs(DerSolGral) - rhs(DerEcua)) = 0$

$$Comprobar := 0 = 0 \tag{11}$$

> $SolHorrible := dsolve(Ecua)$

$$SolHorrible := y(x) = e^{RootOf\left(-e^{2\_Z} + x^2 - 4\,e^{\_Z} + 2\ln(x+1) + 2\_C1 - 2\_Z - 2x - 3\right)} + 1 \tag{12}$$

> $SolDos := separablesol(Ecua)$

$$SolDos := \left\{ y(x) = e^{RootOf\left(-e^{2\_Z} + x^2 - 4\,e^{\_Z} + 2\ln(x+1) + 2\_C1 - 2\_Z - 2x - 3\right)} + 1 \right\} \tag{13}$$

> $restart$

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

$$Ecua := 3\,e^x\tan(y(x)) + \left(2-e^x\right)\sec(y(x))^2\left(\frac{d}{dx}\,y(x)\right) = 0 \tag{14}$$

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

$$[\_separable] \tag{15}$$

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

$$M := 3\,e^x\tan(y) \tag{16}$$

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

$$N := \left(2 - e^x\right)\sec(y)^2 \tag{17}$$

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

$$P := 3\,e^x$$
$$Q := \tan(y)$$
$$R := 2 - e^x$$
$$S := \sec(y)^2 \tag{18}$$

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

$$SolucionGeneral := -3\ln\left(2 - e^x\right) + \ln(\tan(y)) = \_C1 \tag{19}$$

> $SolGral := expand(\exp(lhs(SolucionGeneral))) = \_C1$

$$SolGral := \frac{\tan(y)}{\left(2 - e^x\right)^3} = \_C1 \tag{20}$$

> $Ecua$

$$3\,e^x\tan(y(x)) + \left(2 - e^x\right)\sec(y(x))^2\left(\frac{d}{dx}\,y(x)\right) = 0 \tag{21}$$

> $SolDos := \dfrac{\tan(y(x))}{\left(2 - e^x\right)^3} = \_C1$

$$SolDos := \dfrac{\tan(y(x))}{\left(2 - e^x\right)^3} = \_C1 \tag{22}$$

> $DerSolDos := simplify(isolate(diff(SolDos, x), diff(y(x), x)))$

$$DerSolDos := \dfrac{d}{dx}\, y(x) = \dfrac{3\, e^x \sin(y(x))\, \cos(y(x))}{-2 + e^x} \tag{23}$$

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

$$DerEcua := \dfrac{d}{dx}\, y(x) = \dfrac{3\, e^x \sin(y(x))\, \cos(y(x))}{-2 + e^x} \tag{24}$$

> $Comprobar := simplify(rhs(DerSolDos) - rhs(DerEcua)) = 0$

$$Comprobar := 0 = 0 \tag{25}$$

> $restart$

> $Ecua := sqrt\left(x^2 - y(x)^2\right) + y(x) - x \cdot diff(y(x), x) = 0$

$$Ecua := \sqrt{x^2 - y(x)^2} + y(x) - x\left(\dfrac{d}{dx}\, y(x)\right) = 0 \tag{26}$$

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

$$[[\_homogeneous, class\ A], \_rational, \_dAlembert] \tag{27}$$

> $EcuaDos := simplify(eval(subs(y(x) = x \cdot u(x), Ecua)))$

$$EcuaDos := -\left(\dfrac{d}{dx}\, u(x)\right) x^2 + \sqrt{-x^2\left(u(x)^2 - 1\right)} = 0 \tag{28}$$

> $odeadvisor(EcuaDos)$

$$[[\_homogeneous, class\ G], \_rational] \tag{29}$$

> $EcuaTres := lhs(EcuaDos) - \left(-\left(\dfrac{d}{dx}\, u(x)\right) x^2\right) = rhs(EcuaDos) - \left(-\left(\dfrac{d}{dx}\, u(x)\right) x^2\right)$

$$EcuaTres := \sqrt{-x^2\left(u(x)^2 - 1\right)} = \left(\dfrac{d}{dx}\, u(x)\right) x^2 \tag{30}$$

> $EcuaCuatro := lhs(EcuaTres)^2 = rhs(EcuaTres)^2$

$$EcuaCuatro := -x^2\left(u(x)^2 - 1\right) = \left(\dfrac{d}{dx}\, u(x)\right)^2 x^4 \tag{31}$$

> $EcuaCinco := \dfrac{lhs(EcuaCuatro)}{x^2} = \dfrac{rhs(EcuaCuatro)}{x^2}$

$$EcuaCinco := -u(x)^2 + 1 = \left(\dfrac{d}{dx}\, u(x)\right)^2 x^2 \tag{32}$$

> $EcuaSeis := sqrt(lhs(EcuaCinco)) = \left(\dfrac{d}{dx}\, u(x)\right) x$

$$EcuaSeis := \sqrt{-u(x)^2 + 1} = \left(\dfrac{d}{dx}\, u(x)\right) x \tag{33}$$

> $odeadvisor(EcuaSeis)$

$$[\_separable] \tag{34}$$

> $M := \sqrt{-u^2 + 1}$

$$M := \sqrt{-u^2 + 1} \tag{35}$$

> $N := -x$

$$N := -x \tag{36}$$

> $P := 1; Q := M; R := N; S := 1$

$$P := 1$$
$$Q := \sqrt{-u^2 + 1}$$
$$R := -x$$
$$S := 1 \tag{37}$$

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

$$SolGralSeis := -\ln(x) + \arcsin(u) = \_C1 \tag{38}$$

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

$$SolGralFinal := -\ln(x) + \arcsin\left(\dfrac{y(x)}{x}\right) = \_C1 \tag{39}$$

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

$$DerSolFinal := \dfrac{d}{dx} y(x) = \dfrac{\sqrt{-\dfrac{y(x)^2 - x^2}{x^2}}\, x + y(x)}{x} \tag{40}$$

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

$$DerEcua := \dfrac{d}{dx} y(x) = -\dfrac{-\sqrt{x^2 - y(x)^2} - y(x)}{x} \tag{41}$$

> $Comprueba := simplify(rhs(DerEcua) - rhs(DerSolFinal)) = 0$

$$Comprueba := \dfrac{-\sqrt{-\dfrac{y(x)^2 - x^2}{x^2}}\, x + \sqrt{x^2 - y(x)^2}}{x} = 0 \tag{42}$$

> $CompruebaDos := lhs(Comprueba) \cdot x = 0$

$$CompruebaDos := -\sqrt{-\dfrac{y(x)^2 - x^2}{x^2}}\, x + \sqrt{x^2 - y(x)^2} = 0 \tag{43}$$

> $CompruebaTres := lhs(CompruebaDos) - \left(-\sqrt{-\dfrac{y(x)^2 - x^2}{x^2}}\, x\right) = rhs(CompruebaDos) - \left(\right.$

$\left. -\sqrt{-\dfrac{y(x)^2 - x^2}{x^2}}\, x\right)$

$$CompruebaTres := \sqrt{x^2 - y(x)^2} = \sqrt{-\dfrac{y(x)^2 - x^2}{x^2}}\, x \tag{44}$$

> $CompruebaCuatro := lhs(CompruebaTres)^2 = rhs(CompruebaTres)^2$

$$CompruebaCuatro := x^2 - y(x)^2 = x^2 - y(x)^2 \tag{45}$$

> $CompruebaCinco := lhs(CompruebaCuatro) - rhs(CompruebaCuatro) = 0$

$$CompruebaCinco := 0 = 0 \qquad \text{(46)}$$

>