

```
> restart
> Ecuacion := (y(x)·2 + x·y(x)·2)·diff(y(x), x) + (x·2 - y(x)·x·2) = 0
      Ecuacion := (y(x)2 + x y(x)2) (  $\frac{d}{dx}$  y(x) ) + x2 - y(x) x2 = 0
```

(1)

```
> with(DEtools);
[AreSimilar, DEnormal, DEplot, DEplot3d, DEplot_polygon, DFactor, DFactorLCLM,
 DFactorsols, Dchangevar, 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, lefdivision, 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, righdivision, rtaylor, separablesol, singularities, solve_group,
 super_reduce, symgen, symmetric_power, symmetric_product, symtest, transinv, translate,
 untranslate, varparam, zoom]
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(2)

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> odeadvisor(Ecuacion)
      [_separable]
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(3)

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> M := (x·2 - y·x·2)
      M := x2 - y x2
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(4)

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> N := (y2 + x y2)
      N := y2 + x y2
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(5)

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> factor(M)
      -x2 (-1 + y)
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(6)

```
> factor(N)
      y2 (1 + x)
```

(7)

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> P := -x2; Q := (-1 + y); R := (1 + x); S := y2
      P := -x2
      Q := -1 + y
      R := 1 + x
      S := y2
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(8)

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> SolucionGeneral := int( $\frac{P}{R}, x$ ) + int( $\frac{S}{Q}, y$ ) = C1
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(9)

$$\text{SolucionGeneral} := -\frac{1}{2} x^2 + x - \ln(1+x) + y + \frac{1}{2} y^2 + \ln(-1+y) = C_1 \quad (9)$$

> SolGral := expand(simplify(remove_RootOf(dsolve(Ecuacion))))

$$\begin{aligned} \text{SolGral} := & -\frac{2x}{(y(x)-1)^2} - \frac{3x^2}{(y(x)-1)^2} - \frac{2xy(x)^2}{(y(x)-1)^2} - \frac{2y(x)x^2}{(y(x)-1)^2} - \frac{y(x)^2}{(y(x)-1)^2} \\ & - \frac{2y(x)}{(y(x)-1)^2} + \frac{2Cl}{(y(x)-1)^2} + \frac{x^4}{(y(x)-1)^2} + \frac{4xCl}{(y(x)-1)^2} + \frac{2x^2Cl}{(y(x)-1)^2} \\ & + \frac{4\ln\left(\frac{1+x}{y(x)-1}\right)x}{(y(x)-1)^2} + \frac{2\ln\left(\frac{1+x}{y(x)-1}\right)x^2}{(y(x)-1)^2} - \frac{4xy(x)}{(y(x)-1)^2} - \frac{x^2y(x)^2}{(y(x)-1)^2} \\ & + \frac{2\ln\left(\frac{1+x}{y(x)-1}\right)}{(y(x)-1)^2} = 0 \end{aligned} \quad (10)$$

> SolGralDos := separablesol(Ecuacion)

$$\begin{aligned} \text{SolGralDos} := & \{y(x) \\ & = \left(e^{\text{RootOf}(2_Z^2_Z + x^2_Z - 2x_Z - 3_Z - 4e^{-Z} - 4e^{-Z}x - 1 - 2x - x^2 + 2_Cl_Z)} + 1 \right. \\ & \left. + x \right) e^{-\text{RootOf}(2_Z^2_Z + x^2_Z - 2x_Z - 3_Z - 4e^{-Z} - 4e^{-Z}x - 1 - 2x - x^2 + 2_Cl_Z)} \} \end{aligned} \quad (11)$$

> SolucionGeneral

$$-\frac{1}{2} x^2 + x - \ln(1+x) + y + \frac{1}{2} y^2 + \ln(-1+y) = C_1 \quad (12)$$

> SG := -\frac{1}{2} x^2 + x - \ln(1+x) + y(x) + \frac{1}{2} y(x)^2 + \ln(-1+y(x)) = C_1

$$SG := -\frac{1}{2} x^2 + x - \ln(1+x) + y(x) + \frac{1}{2} y(x)^2 + \ln(y(x)-1) = C_1 \quad (13)$$

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

$$Ecua := \frac{d}{dx} y(x) = \frac{x^2(y(x)-1)}{(1+x)y(x)^2} \quad (14)$$

> EcuaEcua := isolate(Ecuacion, diff(y(x), x))

$$EcuaEcua := \frac{d}{dx} y(x) = \frac{-x^2 + y(x)x^2}{y(x)^2 + xy(x)^2} \quad (15)$$

> Comprobacion := simplify(rhs(Ecua) - rhs(EcuaEcua)) = 0

$$\text{Comprobacion} := 0 = 0 \quad (16)$$