>

Clase de Ecuaciones Diferenciales 02/03/23

> *restart*

> $Ecuacion := x^2 - 3 \cdot x + 5 = 0$

$$Ecuacion := x^2 - 3\,x + 5 = 0 \tag{1}$$

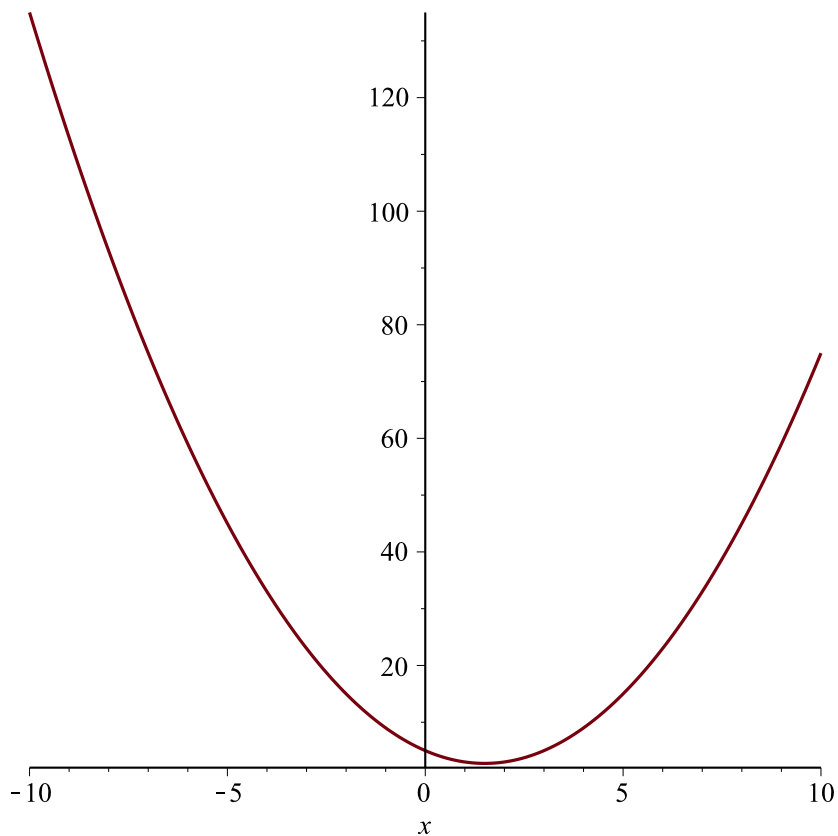> $Ecuacion2 := x^2 + x + 1 = 0$

$$Ecuacion2 := x^2 + x + 1 = 0 \tag{2}$$

> $EcuacionTres := x^2 + 9 = 0$

$$EcuacionTres := x^2 + 9 = 0 \tag{3}$$

> $plot(lhs(Ecuacion), x = -10..10)$

> $Raiz := solve(Ecuacion); evalf(\%)$

$$Raiz := \frac{3}{2} + \frac{1}{2}\, I \sqrt{11}, \ \frac{3}{2} - \frac{1}{2}\, I \sqrt{11}$$

$$1.500000000 + 1.658312395\, I, \ 1.500000000 - 1.658312395\, I \tag{4}$$

> $eval(Raiz[1], 4)$

$$\frac{3}{2} + \frac{1}{2}\, I \sqrt{11} \tag{5}$$

> $evalf(Raiz[1], 4)$

$$1.500 + 1.658\ I \tag{6}$$

> $Valor\_ = \mathrm{sqrt}(2)$

$$Valor\_ = \sqrt{2} \tag{7}$$

> $evalf(\%)$

$$Valor\_ = 1.414213562 \tag{8}$$

>

evalf% da el resultado del inmediato anterior

>

> Pi

$$\pi \tag{9}$$

> $evalf(\mathrm{Pi})$

$$3.141592654 \tag{10}$$

> $evalf(\mathrm{pi})$

$$\pi \tag{11}$$

> $evalf(\mathrm{PI})$

$$\Pi \tag{12}$$

> $evalf(\mathrm{Pi}, 5):$

Los "dos puntos" ejecutan pero no muestran

>

> $RaizDos := solve(Ecuacion2)$

$$RaizDos := -\frac{1}{2} + \frac{1}{2}\ I\sqrt{3},\ -\frac{1}{2} - \frac{1}{2}\ I\sqrt{3} \tag{13}$$

> $evalf(\%, 3)$

$$-0.500 + 0.865\ I,\ -0.500 - 0.865\ I \tag{14}$$

> $RaizTres := solve(EcuacionTres)$

$$RaizTres := 3\ I,\ -3\ I \tag{15}$$

> $f := \exp(x)$

$$f := e^x \tag{16}$$

> $RaizTres[1]; RaizTres[2]$

$$3\ I$$
$$-3\ I \tag{17}$$

> $DiasSemana := [Lunes, Martes, Miercoles, Jueves, Viernes, Sabado, Domingo]$

$$DiasSemana := [Lunes, Martes, Miercoles, Jueves, Viernes, Sabado, Domingo] \tag{18}$$

> $DiasSemana[3]$

$$Miercoles \tag{19}$$

> $DiasHabiles := DiasSemana[1..5]$

$$DiasHabiles := [Lunes, Martes, Miercoles, Jueves, Viernes] \tag{20}$$

> $FinSemana := DiasSemana[6..7]$

$$FinSemana := [Sabado, Domingo] \tag{21}$$

> $AA := array([[1, 2, 3], [4, -5, 7], [2, 7, 8]])$

$$\tag{22}$$

$$AA := \begin{bmatrix} 1 & 2 & 3 \\ 4 & -5 & 7 \\ 2 & 7 & 8 \end{bmatrix} \tag{22}$$

$>$ $with(linalg)$:

$>$ $Valor := det(AA)$

$$Valor := -11 \tag{23}$$

$>$ $InvAA := inverse(AA)$

$$InvAA := \begin{bmatrix} \dfrac{89}{11} & -\dfrac{5}{11} & -\dfrac{29}{11} \\[2mm] \dfrac{18}{11} & -\dfrac{2}{11} & -\dfrac{5}{11} \\[2mm] -\dfrac{38}{11} & \dfrac{3}{11} & \dfrac{13}{11} \end{bmatrix} \tag{24}$$
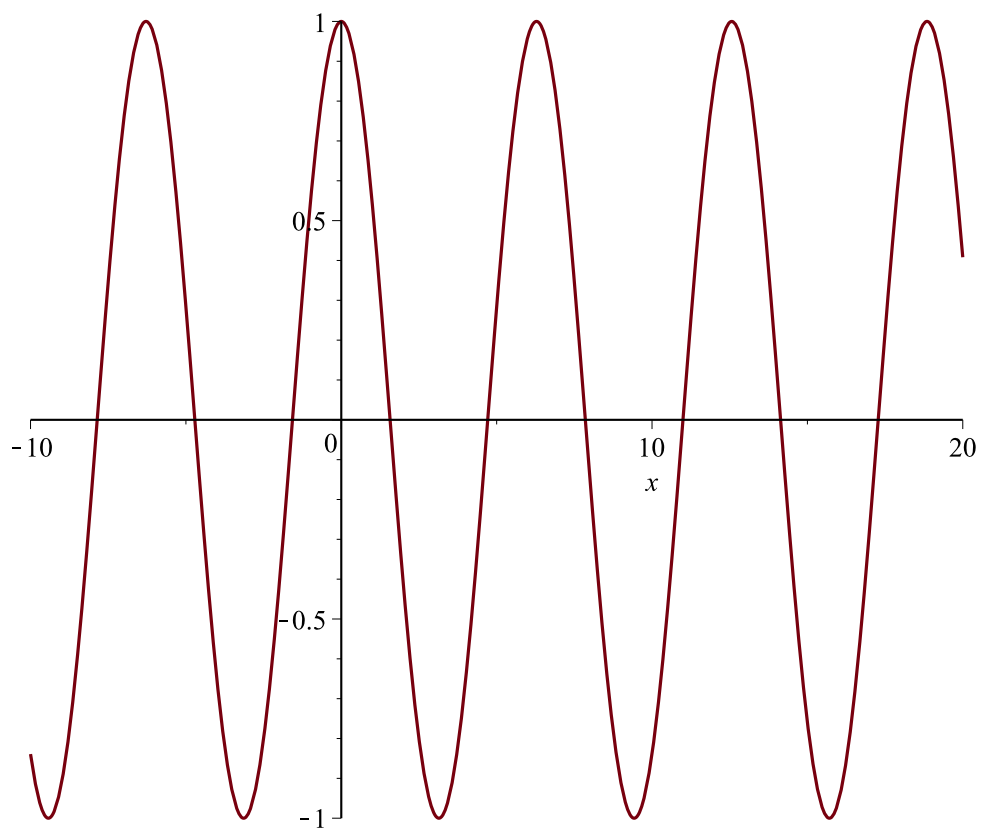
$>$ $Identidad := evalm(AA\&*InvAA)$

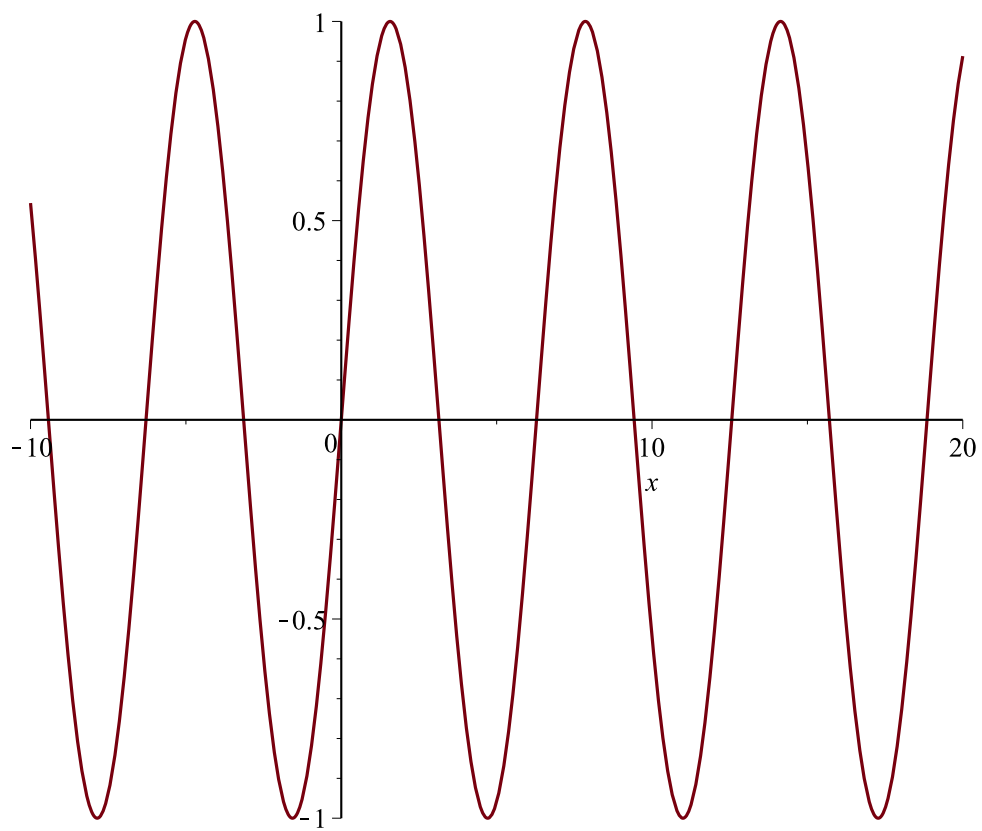$$Identidad := \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \tag{25}$$

$>$

$>$ $evalf(subs(x = 1, f))$

$$2.718281828 \tag{26}$$

$>$ $plot(\cos(x), x = -10 .. 20)$

> $plot(\sin(x), x = -10..20)$

> $plot(\tan(x), x = -10..20)$
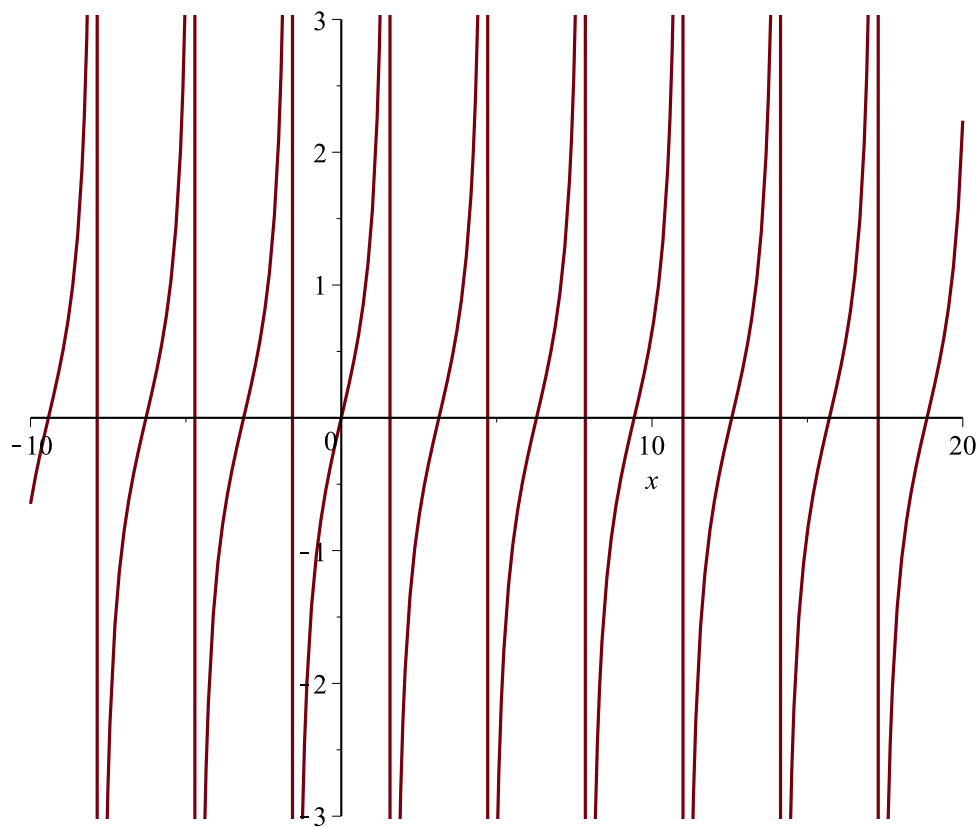
> *restart*

> $f := x^2 \cdot \exp(3 \cdot x) \cdot \cos(5 \cdot x)$

$$f := x^2 \, e^{3x} \cos(5x) \tag{27}$$

> $Derivada := diff(f, x)$

$$Derivada := 2\,x\,e^{3x}\cos(5x) + 3\,x^2\,e^{3x}\cos(5x) - 5\,x^2\,e^{3x}\sin(5x) \tag{28}$$

> $Integral := int(f, x)$

$$Integral := \left(\frac{3}{34}\,x^2 + \frac{8}{289}\,x - \frac{99}{9826} \right) e^{3x}\cos(5x) - \left(-\frac{5}{34}\,x^2 + \frac{15}{289}\,x \right.$$
$$\left. - \frac{5}{9826} \right) e^{3x}\sin(5x) \tag{29}$$

> $IntegralDefinida := int(f, x = 0..1); evalf(\%)$

$$IntegralDefinida := \frac{99}{9826} + \frac{520}{4913}\,e^3\cos(5) + \frac{470}{4913}\,e^3\sin(5)$$
$$-1.229439324 \tag{30}$$

>

> $?int$

>

> $IntegralFormula := Int(f, x = 0..1) = evalf(int(f, x))$

$$IntegralFormula := \int_0^1 x^2\, e^{3x} \cos(5x)\, \mathrm{d}x = \big(0.08823529412\, x^2 + 0.02768166090\, x$$

$$-\, 0.01007531040\big)\, e^{3.x} \cos(5.x) - 1.\big(-0.1470588235\, x^2 + 0.05190311419\, x$$

$$-\, 0.0005088540607\big)\, e^{3.x} \sin(5.x) \tag{31}$$

> $IntegralFormula := int(f, x = 0..1);\ simplify(evalf(\%))$

$$IntegralFormula := \frac{99}{9826} + \frac{520}{4913}\, e^3 \cos(5) + \frac{470}{4913}\, e^3 \sin(5)$$

$$-\, 1.229439324 \tag{32}$$

> $IntegralFormula := Int(f, x = 0..1) = evalf(int(f, x = 0..1))$

$$IntegralFormula := \int_0^1 x^2\, e^{3x} \cos(5x)\, \mathrm{d}x = -1.229439324 \tag{33}$$

> $Sumatoria := Sum(i^2 + 2, i = 1..5) = evalf(sum(i^2 + 2, i = 1..5))$

$$Sumatoria := \sum_{i=1}^5 (i^2 + 2) = 65. \tag{34}$$

> $with(linalg):$
> $with(plots):$
> $with(inttrans):$
> $with(DEtools):$
> $with(PDEtools):$
>
>

> $with(DEtools)$

$[AreSimilar, Closure, DEnormal, DEplot, DEplot3d, DEplot\_polygon, DFactor,$ **(35)**
    $DFactorLCLM, DFactorsols, Dchangevar, Desingularize, FunctionDecomposition, GCRD,$
    $Gosper, Heunsols, Homomorphisms, IVPsol, IsHyperexponential, LCLM, MeijerGsols,$
    $MultiplicativeDecomposition, ODEInvariants, PDEchangecoords, PolynomialNormalForm,$
    $RationalCanonicalForm, ReduceHyperexp, RiemannPsols, Xchange, Xcommutator, Xgauge,$
    $Zeilberger, abelsol, adjoint, autonomous, bernoullisol, buildsol, buildsym, canoni, caseplot,$
    $casesplit, checkrank, chinisol, clairautsol, constcoeffsols, convertAlg, convertsys,$
    $dalembertsol, dcoeffs, de2diffop, dfieldplot, diff\_table, diffop2de, dperiodic\_sols, dpolyform,$
    $dsubs, eigenring, endomorphism\_charpoly, equinv, eta\_k, eulersols, exactsol, expsols,$
    $exterior\_power, firint, firtest, formal\_sol, gen\_exp, generate\_ic, genhomosol, gensys,$
    $hamilton\_eqs, hypergeomsols, hyperode, indicialeq, infgen, initialdata, integrate\_sols,$
    $intfactor, invariants, kovacicsols, leftdivision, liesol, line\_int, linearsol, matrixDE,$
    $matrix\_riccati, maxdimsystems, moser\_reduce, muchange, mult, mutest, newton\_polygon,$
    $normalG2, ode\_int\_y, ode\_y1, odeadvisor, odepde, parametricsol, particularsol,$
    $phaseportrait, poincare, polysols, power\_equivalent, rational\_equivalent, ratsols, redode,$
    $reduceOrder, reduce\_order, regular\_parts, regularsp, remove\_RootOf, riccati\_system,$
    $riccatisol, rifread, rifsimp, rightdivision, rtaylor, separablesol, singularities, solve\_group,$

super_reduce, symgen, symmetric_power, symmetric_product, symtest, transinv, translate,
untranslate, varparam, zoom]

> $EcuacionNoLineal := \left(x^2 + y(x)^2\right) - \left(x^2 - y(x)^2\right) \cdot y' = 0$

$$EcuacionNoLineal := x^2 + y(x)^2 - \left(x^2 - y(x)^2\right)\left(\frac{d}{dx}\,y(x)\right) = 0 \qquad \textbf{(36)}$$

> *odeadvisor*(*EcuacionNoLineal*)

$$[[\_homogeneous,\ class\ A],\ \_rational,\ \_dAlembert] \qquad \textbf{(37)}$$