

```

[> restart
[OPERACIONES CON MATRICES Y VECTORES
[> AA := array([ [1, 2, 3], [4, -5, 6], [7, 8, 9]]);

AA :=  $\begin{bmatrix} 1 & 2 & 3 \\ 4 & -5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$  (1)

[> BB := array([ [-1, 2, -3], [-4, 5, -6], [-7, 8, -9]]);

BB :=  $\begin{bmatrix} -1 & 2 & -3 \\ -4 & 5 & -6 \\ -7 & 8 & -9 \end{bmatrix}$  (2)

[> with(linalg) :
[> CC := evalm( AA + BB ); DD := evalm( AA - BB );

CC :=  $\begin{bmatrix} 0 & 4 & 0 \\ 0 & 0 & 0 \\ 0 & 16 & 0 \end{bmatrix}$ 

DD :=  $\begin{bmatrix} 2 & 0 & 6 \\ 8 & -10 & 12 \\ 14 & 0 & 18 \end{bmatrix}$  (3)

[> EE := evalm( AA &* BB );

EE :=  $\begin{bmatrix} -30 & 36 & -42 \\ -26 & 31 & -36 \\ -102 & 126 & -150 \end{bmatrix}$  (4)

[> evalm(AA); evalm(BB);

 $\begin{bmatrix} 1 & 2 & 3 \\ 4 & -5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ 

 $\begin{bmatrix} -1 & 2 & -3 \\ -4 & 5 & -6 \\ -7 & 8 & -9 \end{bmatrix}$  (5)

[> ValorAbsolutoAA := det(AA); ValorAbsolutoBB := det(BB);
ValorAbsolutoAA := 120
ValorAbsolutoBB := 0 (6)

[> inversaAA := inverse(AA);

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$$inversaAA := \begin{bmatrix} -\frac{31}{40} & \frac{1}{20} & \frac{9}{40} \\ \frac{1}{20} & -\frac{1}{10} & \frac{1}{20} \\ \frac{67}{120} & \frac{1}{20} & -\frac{13}{120} \end{bmatrix} \quad (7)$$

> inversaBB := inverse(BB);

Error, (in linalg:-inverse) singular matrix

> Identidad := evalm(AA &* inversaAA);

$$Identidad := \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad (8)$$

> MMM := array([[-1, 0, 2, 3, 0, 2, 0, 5, 9, 4], [1, -3, 2, 3, -3, 4, -3, 5, 9, 4], [1, 7, 2, -3, 0, -4, -3, 5, 9, 4], [-3, 5, -9, 3], [1, 5, 2, 3, 0, 4, -8, 5, 9, 4], [1, 4, 2, 3, -2, -4, -6, 5, 9, 4], [1, -9, 2, 3, 0, 4, -4, 5, 9, 4], [1, 7, 2, 3, 8, 4, -1, -5, -9, 4], [1, 0, 2, -3, -3, 4, 6, 5, 9, 4], [1, -1, 2, 3, 0, 4, -2, 5, 9, -4], [-1, 8, -2, 3, 2, -4, 7, +5, 9, -4]]);

$$MMM := \begin{bmatrix} -1 & 0 & 2 & 3 & 0 & 2 & 0 & 5 & 9 & 4 \\ 1 & -3 & 2 & 3 & -3 & 4 & -3 & 5 & 9 & 4 \\ 1 & 7 & 2 & -3 & 0 & -4 & -3 & 5 & -9 & 3 \\ 1 & 5 & 2 & 3 & 0 & 4 & -8 & 5 & 9 & 4 \\ 1 & 4 & 2 & 3 & -2 & -4 & -6 & 5 & 9 & 4 \\ 1 & -9 & 2 & 3 & 0 & 4 & -4 & 5 & 9 & 4 \\ 1 & 7 & 2 & 3 & 8 & 4 & -1 & -5 & -9 & 4 \\ 1 & 0 & 2 & -3 & -3 & 4 & 6 & 5 & 9 & 4 \\ 1 & -1 & 2 & 3 & 0 & 4 & -2 & 5 & 9 & -4 \\ -1 & 8 & -2 & 3 & 2 & -4 & 7 & 5 & 9 & -4 \end{bmatrix} \quad (9)$$

> det(MMM);

$$-338964480 \quad (10)$$

> inversaMMM := inverse(MMM);

inversaMMM :=

$$\begin{bmatrix} \left[-\frac{1}{2}, \frac{221}{1226}, 0, -\frac{643}{9808}, \frac{1}{8}, \frac{1445}{9808}, \frac{277}{2452}, \frac{277}{2452}, 0, \frac{277}{2452} \right], \\ \left[0, \frac{14}{613}, 0, \frac{55}{1226}, 0, -\frac{95}{1226}, \frac{6}{613}, \frac{6}{613}, 0, \frac{6}{613} \right], \\ \left[\frac{1}{4}, -\frac{189}{1226}, 0, -\frac{4101}{19616}, \frac{3}{16}, -\frac{2613}{19616}, \frac{289}{4904}, \frac{289}{4904}, \frac{1}{4}, -\frac{937}{4904} \right], \\ \left[0, \frac{548}{1839}, 0, -\frac{287}{2452}, 0, -\frac{173}{2452}, \frac{69}{1226}, -\frac{203}{1839}, 0, \frac{69}{1226} \right] \end{bmatrix}, \quad (11)$$

$$\begin{bmatrix} 0, -\frac{160}{613}, 0, \frac{36}{613}, 0, \frac{105}{613}, \frac{19}{613}, \frac{19}{613}, 0, \frac{19}{613} \\ 0, \frac{101}{1226}, 0, \frac{799}{9808}, -\frac{1}{8}, -\frac{377}{9808}, -\frac{1}{2452}, -\frac{1}{2452}, 0, -\frac{1}{2452} \\ 0, \frac{49}{613}, 0, -\frac{57}{613}, 0, -\frac{13}{613}, \frac{21}{613}, \frac{21}{613}, 0, \frac{21}{613} \\ 0, \frac{1377}{24520}, \frac{1}{10}, \frac{125}{4904}, -\frac{1}{10}, \frac{627}{9808}, -\frac{811}{24520}, -\frac{811}{24520}, -\frac{1}{80}, \frac{1641}{24520} \\ 0, -\frac{557}{4904}, -\frac{1}{18}, \frac{1603}{44136}, \frac{1}{18}, \frac{233}{9808}, -\frac{397}{44136}, \frac{685}{14712}, \frac{1}{144}, -\frac{397}{44136} \\ 0, \frac{105}{2452}, 0, \frac{53}{2452}, 0, \frac{207}{4904}, \frac{45}{2452}, \frac{45}{2452}, -\frac{1}{8}, \frac{45}{2452} \end{bmatrix}$$

> *IdentidadMMM* := evalm(*MMM* &* *inversaMMM*);

$$IdentidadMMM := \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

(12)

> restart

FUNCIONES PARA CÁLCULO DIFERENCIAL E INTEGRAL

> *F*(*x*, *y*) := *x*·3·*y*·2 + 7·*x*·*y*·4 - 8·*x*·4·*y*·2;

$$F(x, y) := x^3 y^2 + 7 x y^4 - 8 x^4 y^2$$

(13)

> *DerivadaRespectoAyy* := diff(*F*(*x*, *y*), *y*, *y*);

$$DerivadaRespectoAyy := 2 x^3 + 84 x y^2 - 16 x^4$$

(14)

> *DerivadaRespectoAxxx* := diff(*F*(*x*, *y*), *x*\$3);

$$DerivadaRespectoAxxx := 6 y^2 - 192 x y^2$$

(15)

> *DerivadaRespectoAxy* := diff(*F*(*x*, *y*), *x*, *y*);

$$DerivadaRespectoAxy := 6 x^2 y + 28 y^3 - 64 x^3 y$$

(16)

> *DerivadaRespectoAyx* := diff(*F*(*x*, *y*), *y*, *x*);

$$DerivadaRespectoAyx := 6 x^2 y + 28 y^3 - 64 x^3 y$$

(17)

> *f*(*x*) := *x*·3·cos(-5·*x*)·exp(4·*x*);

$$f(x) := x^3 \cos(5 x) e^{4 x}$$

(18)

> *IntegralIndefinifaDef* := int(*f*(*x*), *x*) : evalf(%, 2);

$$(0.098 x^3 + 0.016 x^2 - 0.021 x + 0.0032) e^{4 x} \cos(5 x) - 1. (-0.12 x^3 + 0.071 x^2 - 0.010 x$$

(19)

$-0.0015) e^{4 \cdot x} \sin(5 \cdot x)$

> *IntegralDefinidaDef* := *int*(*f*(*x*), *x* = -1 .. 1) : *evalf*(%, 50);
 $-1.7562292735658697608615751816431707515475496807064$

(20)

> *restart* :

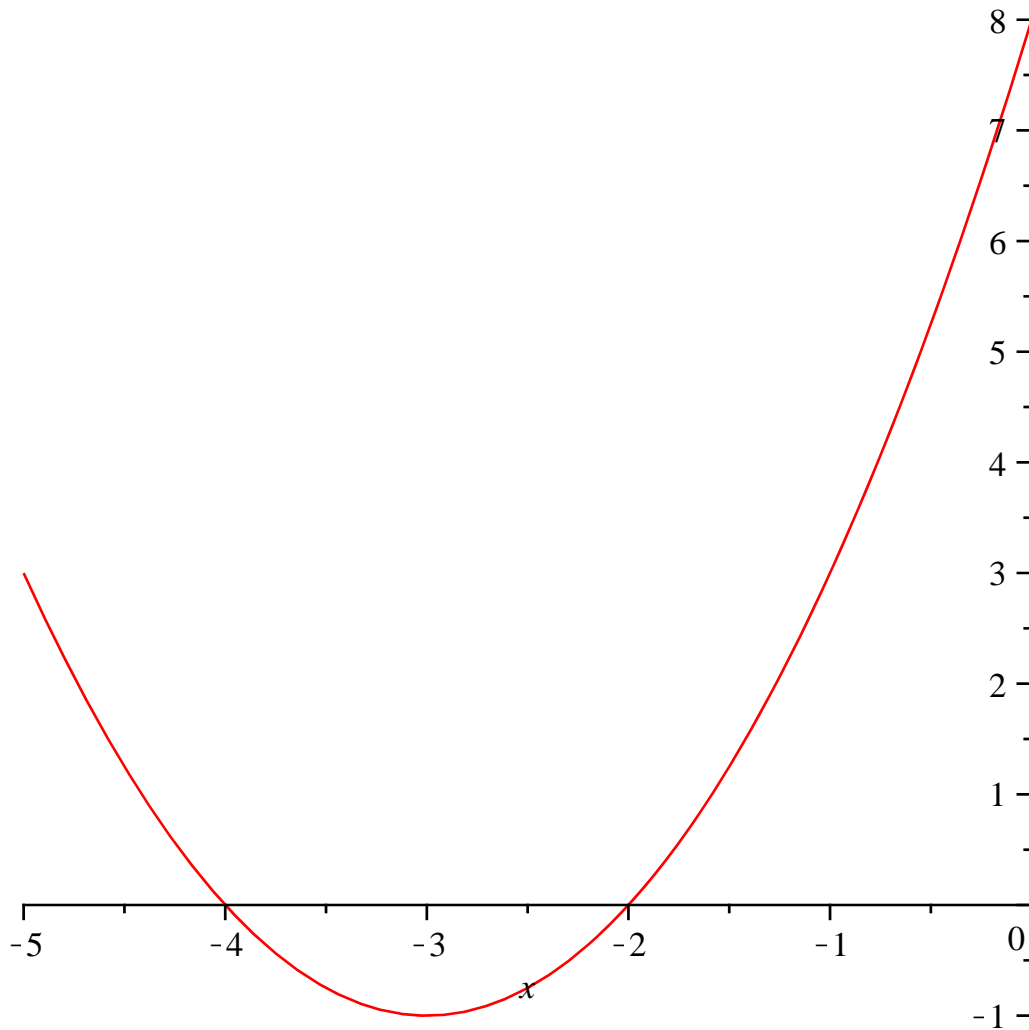
GEOMETRÍA ANALÍTICA

> *f*(*x*) := $x \cdot 2 + 6 \cdot x + 8 = 0$;

$f(x) := x^2 + 6x + 8 = 0$

(21)

> *plot*(*lhs*(*f*(*x*)), *x* = -5 .. 0);



> *raiz* := *solve*(*f*(*x*));

$raiz := -2, -4$

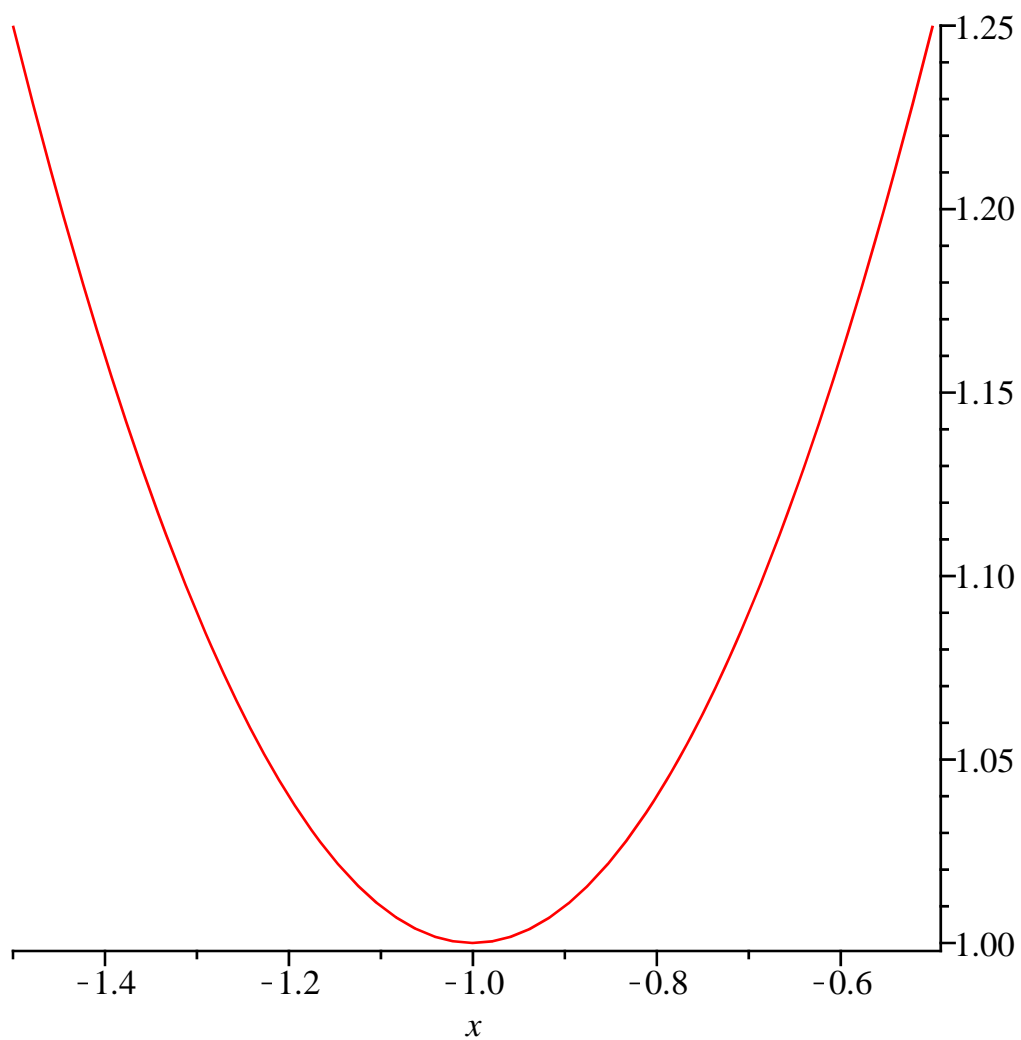
(22)

> *g*(*x*) := $x \cdot 2 + 2 \cdot x + 2 = 0$;

$g(x) := x^2 + 2x + 2 = 0$

(23)

> *plot*(*lhs*(*g*(*x*)), *x* = -1.5 .. -0.5);

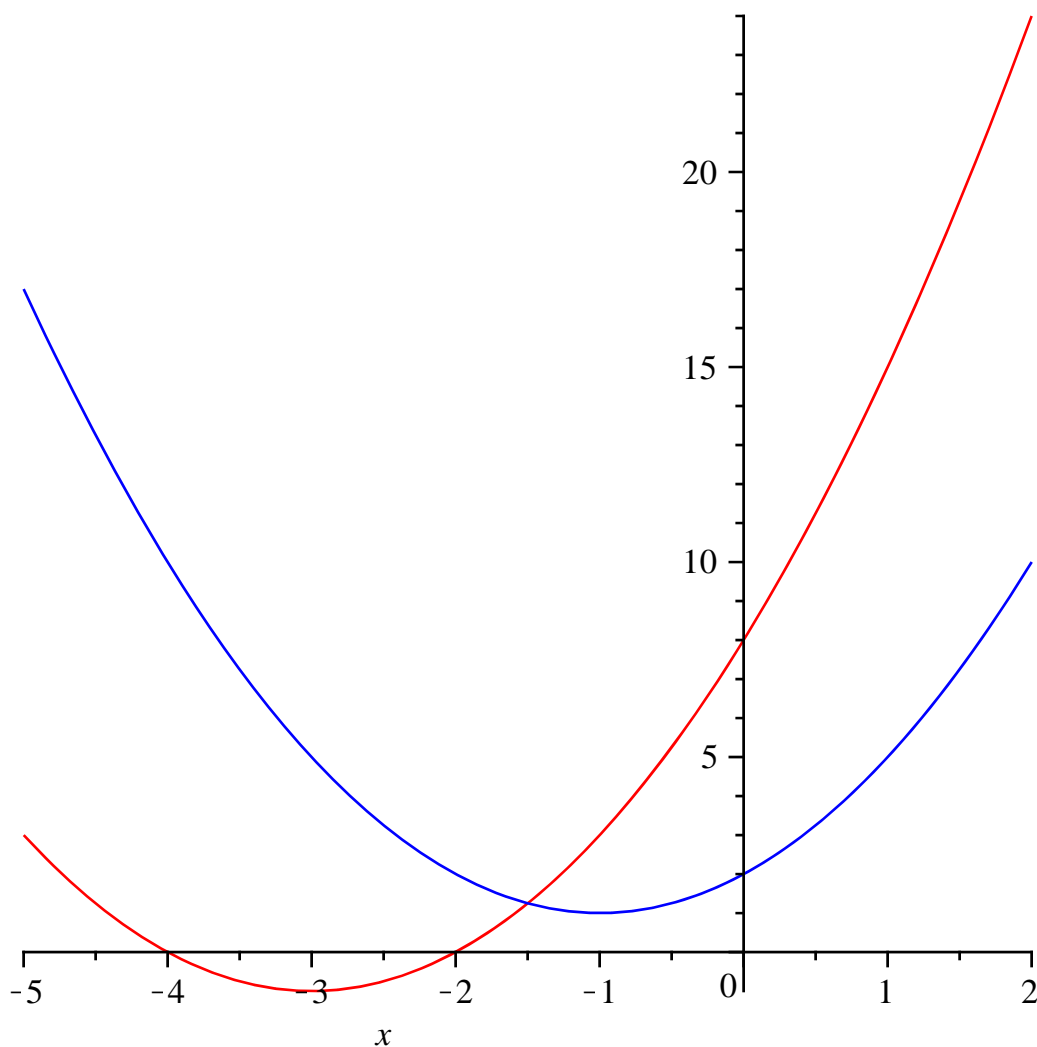


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> raiz2 := solve(g(x));
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raiz2 := -1 + I, -1 - I
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(24)

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> plot([lhs(f(x)), lhs(g(x))], x=-5..2, color=[red, blue]);
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```
> with(plots);
[animate, animate3d, animatecurve, arrow, changecoords, complexplot, complexplot3d,
conformal, conformal3d, contourplot, contourplot3d, coordplot, coordplot3d, densityplot,
display, dualaxisplot, fieldplot, fieldplot3d, gradplot, gradplot3d, graphplot3d, implicitplot,
implicitplot3d, inequal, interactive, interactiveparams, intersectplot, listcontplot,
listcontplot3d, listdensityplot, listplot, listplot3d, loglogplot, logplot, matrixplot, multiple,
odeplot, pareto, plotcompare, pointplot, pointplot3d, polarplot, polygonplot, polygonplot3d,
polyhedra_supported, polyhedraplot, rootlocus, semilogplot, setcolors, setoptions,
setoptions3d, spacecurve, sparsematrixplot, surfdata, textplot, textplot3d, tubeplot]
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> restart :
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ECUACIONES DIFERENCIALES

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> Ecuacion := y'' - 5·y' + 6·y = 0;
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$$Ecuacion := \frac{d^2}{dx^2} y(x) - 5 \left(\frac{d}{dx} y(x) \right) + 6 y(x) = 0 \quad (26)$$

```
> Ecuacion2 := diff(y(x), x$2) - 5·diff(y(x), x) + 6·y(x) = 0;
```

$$Ecuacion2 := \frac{d^2}{dx^2} y(x) - 5 \left(\frac{d}{dx} y(x) \right) + 6 y(x) = 0 \quad (27)$$

```
> SolucionGeneral := dsolve(Ecuacion);
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$$\text{SolucionGeneral} := y(x) = _C1 e^{3x} + _C2 e^{2x} \quad (28)$$

```
> CondicionesIniciales := y(0) = -4, D(y)(0) = 6;
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$$\text{CondicionesIniciales} := y(0) = -4, D(y)(0) = 6 \quad (29)$$

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> SolucionParticular := dsolve( {Ecuacion, CondicionesIniciales} );
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$$\text{SolucionParticular} := y(x) = 14 e^{3x} - 18 e^{2x} \quad (30)$$

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