

Inicio de hoja

```
[ > restart;
```

Rutinas adicionales

```
[ Se reclaman paquetes de rutinas. Usaremos frecuentemente los siguientes paquetes: student,
```

```
[ plots, linalg.
```

```
[ > with(student):
```

```
[ > with(plots):  
Warning, the name changecoords has been redefined
```

```
[ > with(linalg):
```

```
[ Warning, the protected names norm and trace have been redefined and  
unprotected
```

Operaciones elementales

```
[ > 2+5;
```

```
7
```

```
[ > 2+3/2;
```

```
 $\frac{7}{2}$ 
```

```
[ > 2^3;
```

```
8
```

```
[ > 2*3;
```

```
6
```

```
[ > Pi;
```

```
 $\pi$ 
```

```
[ > sqrt(3);
```

```
 $\sqrt{3}$ 
```

```
[ > sqrt(3.0);
```

```
1.732050808
```

```
[ > 2/3;
```

```
 $\frac{2}{3}$ 
```

```
[ > 2./3.;
```

```
0.6666666667
```

```
[ > evalf(2/3);
```

```
0.6666666667
```

```
[ > evalf(2/3,15);
```

```
0.6666666666666667
```

Vectores y matrices

```
[ Abrimos el paquete de álgebra lineal.
```

```
[ > with(linalg):
```

Vectores

```
[ Distintas formas de dar un vector:
```

```
[ > vector(4, [1, x, x^2, x^3]);
```

```
[                                     [ 1, x, x^2, x^3 ]
```

```
[ > array(1..4, [1, x, x^2, x^3]);
```

```
[                                     [ 1, x, x^2, x^3 ]
```

```
[ > v:=[1, x, x^2, x^3];
```

```
[                                     v := [ 1, x, x^2, x^3 ]
```

```
[ > <1, x, x^2, x^3>;
```

```
[                                     
$$\begin{bmatrix} 1 \\ x \\ x^2 \\ x^3 \end{bmatrix}$$

```

Matrices

```
[ > A:=matrix(2,3, [1,2,3,5,-7,12]);
```

```
[                                      $A := \begin{bmatrix} 1 & 2 & 3 \\ 5 & -7 & 12 \end{bmatrix}$ 
```

```
[ > matrix([[1,2,3],[5,-7,12]]);
```

```
[                                      $\begin{bmatrix} 1 & 2 & 3 \\ 5 & -7 & 12 \end{bmatrix}$ 
```

```
[ > B:=matrix([[3,4],[2,7],[14,-23]]);
```

```
[                                      $B := \begin{bmatrix} 3 & 4 \\ 2 & 7 \\ 14 & -23 \end{bmatrix}$ 
```

```
[ > C:=matrix([[2,4,0],[4,7,6]]);
```

```
[                                      $C := \begin{bmatrix} 2 & 4 & 0 \\ 4 & 7 & 6 \end{bmatrix}$ 
```

```
[ > evalm(A+C);
```

```
[                                      $\begin{bmatrix} 3 & 6 & 3 \\ 9 & 0 & 18 \end{bmatrix}$ 
```

```
[ > evalm(5*B);
```

```
[                                      $\begin{bmatrix} 15 & 20 \\ 10 & 35 \\ 70 & -115 \end{bmatrix}$ 
```

```
[ > E:=evalm(A&*B);
```

```
[                                      $E := \begin{bmatrix} 49 & -51 \\ 169 & -305 \end{bmatrix}$ 
```

```
[ > evalm(E^2);
```


[[[[[

Sirve para resolver de forma exacta ecuaciones o sistemas de ecuaciones. Tiene dos argumentos, en el primero se escriben entre llaves las ecuaciones a resolver separadas por comas; en el segundo, también entre llaves, las incógnitas.

$$\left[\begin{array}{c} [\\ [\\ [\\ [\end{array} \right]$$

!!!CUIDADO!!! Porque el $(0,0,0)$ no es la única solución del sistema anterior.

$$C := \begin{bmatrix} 1 & -2 & 4 \\ 3 & -2 & 1 \\ 2 & 0 & -3 \end{bmatrix}$$

```
> rank(C);
```

2

```
> solve({x+2*y+4*z=0, 3*x-2*y+z=0}, {x, y, z});
```

$$\{z = z, y = -\frac{11z}{8}, x = -\frac{5z}{4}\}$$

- Funciones elementales en Maple

- Funciones logarítmicas y exponenciales

```
> e^3;
```

$$e^3$$

```
> evalf(%);
```

$$e^3$$

```
> exp(3);
```

$$e^3$$

```
> evalf(%);
```

$$20.08553692$$

```
> log[10](10);
```

$$1$$

```
> log[3](27);
```

$$3$$

```
> log10(100);
```

$$2$$

```
> ln(exp(4));
```

$$4$$

```
> log(exp(3));
```

$$3$$

- Funciones trigonométricas

```
> sin(Pi/6);
```

$$\frac{1}{2}$$

```
> cos(Pi/6);
```

$$\frac{\sqrt{3}}{2}$$

```

> tan(Pi/4);
1
> arctan(1);
 $\frac{\pi}{4}$ 
> arcsin(1/2);
 $\frac{\pi}{6}$ 
> arcsin(0.5);
0.5235987756
> arccos(sqrt(3)/2);
 $\frac{\pi}{6}$ 
> arctan(1);
 $\frac{\pi}{4}$ 
> csc(Pi/6);
2
> sec(Pi/6);
 $\frac{2\sqrt{3}}{3}$ 
> cot(Pi/4);
1

```

Funciones hiperbólicas

```

> sinh(4);
sinh(4)
> evalf(%);
27.28991720
> (exp(4.) - exp(-4.))/2;
27.28991720
> csch(2);
csch(2)
> evalf(%);
0.2757205648

```

Asignación de variables

```

[ > 3*a+1;
[
[ > a:=2;
[
[ > 3*a+1;
[
[

```

$$3a + 1$$

$$a := 2$$

$$7$$

El número Pi en Maple

```

[ > Pi;
[
[ > evalf(%);
[
[ > pi;
[
[ > evalf(%);
[
[

```

$$\pi$$

$$3.141592654$$

$$\pi$$

$$\pi$$

Funciones

```

[ > f:=x->x^2;
[
[ > f(3);
[
[ > log(x*f(x)+1);
[
[ > f:=x->(log(1+x^2)+5*x)/(sin(x)+sinh(x));
[
[ > f(2);
[
[ > evalf(%);
[
[ > f:=x->x^3;
[
[ > g:=x->log(x);
[
[ > h:=x->exp(x);
[
[ > f(g(x));
[
[

```

$$f := x \rightarrow x^2$$

$$9$$

$$\ln(x^3 + 1)$$

$$f := x \rightarrow \frac{\log(1 + x^2) + 5x}{\sin(x) + \sinh(x)}$$

$$\frac{\ln(5) + 10}{\sin(2) + \sinh(2)}$$

$$2.559310838$$

$$f := x \rightarrow x^3$$

$$g := x \rightarrow \log(x)$$

$$h := x \rightarrow e^x$$

```
> g(f(x));
```

$$\ln(x)^3$$

```

> F := x -> g(h(x));

```

$$\ln(x^3)$$

$$F := x \rightarrow g(h(x))$$

$$y > F(x);$$

$$\ln(\mathbf{e}^x)$$

[>

[

[>

[>