Matlab

--- Muestra versión de Matlab

```
>> version
```

```
ans =
7.6.0.324 (R2008a)
```

--- Muestra versión de Matlab y versión de cada Toolbox

```
>> ver
```

```
-----------------------------------------------------------------------
MATLAB Version 7.6.0.324 (R2008a)
MATLAB License Number: 161051
Operating System: Microsoft Windows Vista Version 6.2 (Build 9200)
Java VM Version: Java 1.6.0 with Sun Microsystems Inc. Java HotSpot(TM)
Client VM mixed mode
-----------------------------------------------------------------------
MATLAB                                          Version 7.6         (R2008a)
Simulink                                        Version 7.1         (R2008a)
Aerospace Blockset                              Version 3.1         (R2008a)
Aerospace Toolbox                               Version 2.1         (R2008a)
Bioinformatics Toolbox                          Version 3.1         (R2008a)

                                                .... continua .....
```

--- Crear vector M1

```
>> M1=[1 2 3 4 5]
```

```
M1 =
     1     2     3     4     5
```

--- Crear vector M2

```
>> M2=[2; 4; 6]
```

```
M2 =
     2
     4
     6
```

--- Crear matriz M3

```
>> M3=[1 3 5; 20 22 24; 5 10 5]
```

```
M3 =
     1     3     5
    20    22    24
     5    10     5
```

--- Multiplicando por un escalar

```
>> 2*M1

ans =
     2     4     6     8    10

--- ans es una variable del Matlab que se crea cuando una realiza
--- un calculo y no fue asignado a una variable.

--- El valor actual de ans es asignado a la variable R1

>> R1=ans

R1 =
     2     4     6     8    10

>> 3*M2

ans =
     6
    12
    18

>> R2=5*M2

R2 =
    10
    20
    30

>> A=[-1 6 -0.9; 1/4 10 12; 7 12 -3]

A =
   -1.0000    6.0000   -0.9000
    0.2500   10.0000   12.0000
    7.0000   12.0000   -3.0000

--- Mostrando valores de variable M3

>> M3

M3 =
     1     3     5
    20    22    24
     5    10     5

--- Variable o función no definida

>> M5
??? Undefined function or variable 'M5'.

>> P1=3*A+(1/3)*M3

P1 =
   -2.6667   19.0000   -1.0333
```

```
    7.4167   37.3333   44.0000
   22.6667   39.3333   -7.3333
```

```
>> A*2
```

```
ans =
   -2.0000   12.0000   -1.8000
    0.5000   20.0000   24.0000
   14.0000   24.0000   -6.0000
```

--- Matriz transpuesta (M1 es un vector horizontal)

```
>> M1'
```

```
ans =
     1
     2
     3
     4
     5
```

```
>> M3
```

```
M3 =
     1     3     5
    20    22    24
     5    10     5
```

```
>> A
```

```
A =
   -1.0000    6.0000   -0.9000
    0.2500   10.0000   12.0000
    7.0000   12.0000   -3.0000
```

```
>> A'
```

```
ans =
   -1.0000    0.2500    7.0000
    6.0000   10.0000   12.0000
   -0.9000   12.0000   -3.0000
```

```
>> whos
  Name       Size              Bytes  Class     Attributes

  A          3x3                  72  double
  M1         1x5                  40  double
  M2         3x1                  24  double
  M3         3x3                  72  double
  P1         3x3                  72  double
  R1         1x5                  40  double
  R2         3x1                  24  double
  ans        3x3                  72  double
```

```
>> k=1/3
```

```
k =
    0.3333
```

--- Cambiando de formato de dato a long

```
>> format long
```

```
>> k
```

```
k =
   0.333333333333333
```

```
>> A
```

```
A =
  -1.000000000000000   6.000000000000000  -0.900000000000000
   0.250000000000000  10.000000000000000  12.000000000000000
   7.000000000000000  12.000000000000000  -3.000000000000000
```

```
>> M3
```

```
M3 =
     1     3     5
    20    22    24
     5    10     5
```

```
>> ans
```

```
ans =
  -1.000000000000000   0.250000000000000   7.000000000000000
   6.000000000000000  10.000000000000000  12.000000000000000
  -0.900000000000000  12.000000000000000  -3.000000000000000
```

--- Cambiando de formato de dato a short

```
>> format short
```

```
>> P1=3*A+(1/3)*M3
```

```
P1 =
   -2.6667   19.0000   -1.0333
    7.4167   37.3333   44.0000
   22.6667   39.3333   -7.3333
```

```
>> format long
```

```
>> P1
```

```
P1 =
  -2.666666666666667  19.000000000000000  -1.033333333333334
   7.416666666666666  37.333333333333336  44.000000000000000
  22.666666666666668  39.333333333333336  -7.333333333333334
```

```
>> format short
```

```
>> P1

P1 =
   -2.6667   19.0000   -1.0333
    7.4167   37.3333   44.0000
   22.6667   39.3333   -7.3333
```

--- Cambiando de formato de dato a bank

```
>> format bank

>> P1

P1 =
          -2.67          19.00          -1.03
           7.42          37.33          44.00
          22.67          39.33          -7.33
```

--- Cambiando de formato de dato a rat

```
>> format rat

>> P1

P1 =
      -8/3           19          -31/30
      89/12         112/3         44
      68/3          118/3        -22/3

>> pi

ans =
     355/113

>> format bank

>> pi

ans =
          3.14

>> format short

>> pi

ans =
    3.1416

>> 355/113

ans =
    3.1416

>> format long
```

```
>> 355/113

ans =
   3.141592920353983

>> pi

ans =
   3.141592653589793
```

--- Guardara las variables definidas en la ventana de comando

```
>> save variables01
```

--- Muestra todas las rutas de los toolbox

```
>> path

            MATLABPATH

      C:\Users\Master\Documents\MATLAB
      C:\Program Files (x86)\MATLAB\R2008a\toolbox\matlab\general
      C:\Program Files (x86)\MATLAB\R2008a\toolbox\matlab\ops
      C:\Program Files (x86)\MATLAB\R2008a\toolbox\matlab\lang
      ....
```

--- Crear el archivo Matlab01.txt

```
>> diary Matlab01.txt
```

--- Realizo operaciones

```
>> A

A =
  -1.000000000000000   6.000000000000000  -0.900000000000000
   0.250000000000000  10.000000000000000  12.000000000000000
   7.000000000000000  12.000000000000000  -3.000000000000000

>> A'

ans =
  -1.000000000000000   0.250000000000000   7.000000000000000
   6.000000000000000  10.000000000000000  12.000000000000000
  -0.900000000000000  12.000000000000000  -3.000000000000000

>> A*A'

ans =
  1.0e+002 *

   0.378100000000000   0.489500000000000   0.677000000000000
   0.489500000000000   2.440625000000000   0.857500000000000
   0.677000000000000   0.857500000000000   2.020000000000000
```

```
--- Cerrando archivo

>> diary off

--- Revisar el contenido del archivo Matlab01.txt y encontramos los
comandos y resultados.

--- muestra las variables activas

>> whos

--- cargar variables guardadas

>> load variables01

>> whos
  Name        Size              Bytes  Class     Attributes

  A           3x3                  72  double
  M1          1x5                  40  double
  M2          3x1                  24  double
  M3          3x3                  72  double
  P1          3x3                  72  double
  R1          1x5                  40  double
  R2          3x1                  24  double
  ans         1x1                   8  double
  k           1x1                   8  double

--- eliminar todas las variables

>> clear

--- verificando que no hay variables definidas

>> whos

--- cargar variables guardadas

>> load variables01

>> whos
  Name        Size              Bytes  Class     Attributes

  A           3x3                  72  double
  M1          1x5                  40  double
  M2          3x1                  24  double
  M3          3x3                  72  double
  P1          3x3                  72  double
  R1          1x5                  40  double
  R2          3x1                  24  double
  ans         1x1                   8  double
  k           1x1                   8  double

--- eliminar la matriz M1
```

```
>> clear M1
```

--- verificando que ya no existe variable M1

```
>> whos
  Name        Size              Bytes  Class     Attributes

  A           3x3                  72  double
  M2          3x1                  24  double
  M3          3x3                  72  double
  P1          3x3                  72  double
  R1          1x5                  40  double
  R2          3x1                  24  double
  ans         1x1                   8  double
  k           1x1                   8  double
```

--- Ayuda de función clear

```
>> help clear
 CLEAR  Clear variables and functions from memory.
    CLEAR removes all variables from the workspace.
    CLEAR VARIABLES does the same thing.
    CLEAR GLOBAL removes all global variables.
    CLEAR FUNCTIONS removes all compiled M- and MEX-functions.

    CLEAR ALL removes all variables, globals, functions and MEX links.
    CLEAR ALL at the command prompt also removes the Java packages import
    list.
                                                                  ........

    Reference page in Help browser
       doc clear        <------- hacer clic para más información
```

--- limpia la ventana de comando y
--- ubica cursor en la parte superior de la ventana

```
>> clc
```

```
>> help format
 FORMAT Set output format.
    FORMAT with no inputs sets the output format to the default
appropriate
    for the class of the variable. For float variables, the default is
    FORMAT SHORT.
                                                                  ........

    Reference page in Help browser
       doc format       <------- hacer clic para más información
```

--- Operadores

--- Potenciación (^ --> Alt + 9,4)

```
>> 78^2
```

```
ans =
        6084
```

--- División

```
>> 29/23

ans =
    1.2609
```

--- División inversa (\ --> Alt + 9,2)

```
>> 29\23
ans =
    0.7931

>> 23/29

ans =
    0.7931

>> help cos
 COS    Cosine of argument in radians.
    COS(X) is the cosine of the elements of X.

    See also acos, cosd.

    Overloaded methods:
       distributed/cos
       sym/cos

    Reference page in Help browser
       doc cos
>> help sin
 SIN    Sine of argument in radians.
    SIN(X) is the sine of the elements of X.

    See also asin, sind.

    Overloaded methods:
       distributed/sin
       sym/sin

    Reference page in Help browser
       doc sin

>> help tan
 TAN    Tangent of argument in radians.
    TAN(X) is the tangent of the elements of X.

    See also atan, tand, atan2.

    Overloaded methods:
       distributed/tan
       sym/tan
```

```
    Reference page in Help browser
       doc tan
>> eps

ans =

  2.2204e-016

>> K=[1 2 3
4 5 6
7 8 9]

K =

     1     2     3
     4     5     6
     7     8     9
>> WHO
??? Undefined function or variable 'WHO'.

>> who

Your variables are:

A    K    M2   M3   P1   R1   R2   ans  k

>> whos
  Name        Size                Bytes  Class     Attributes

  A           3x3                    72  double
  K           3x3                    72  double
  M2          3x1                    24  double
  M3          3x3                    72  double
  P1          3x3                    72  double
  R1          1x5                    40  double
  R2          3x1                    24  double
  ans         1x1                     8  double
  k           1x1                     8  double

>> R1

R1 =
     2     4     6     8    10

>> diag(R1)

ans =
     2     0     0     0     0
     0     4     0     0     0
     0     0     6     0     0
     0     0     0     8     0
     0     0     0     0    10

>> R2
```

```
R2 =
    10
    20
    30

>> diag(R2)

ans =
    10     0     0
     0    20     0
     0     0    30
>> A

A =
   -1.0000    6.0000   -0.9000
    0.2500   10.0000   12.0000
    7.0000   12.0000   -3.0000

>> diag(A)

ans =
    -1
    10
    -3

>> M=[1 2 3 4 5
6 7 8 9 10
11 12 13 14 15]

M =
     1     2     3     4     5
     6     7     8     9    10
    11    12    13    14    15

>> diag(M)

ans =
     1
     7
    13

>> a=17; V=[1 2 3]; toeplitz(V)

ans =
     1     2     3
     2     1     2
     3     2     1

>> who

Your variables are:

A    K    M    M2   M3   P1   R1   R2   V    a    ans  k
```

```
>> a

a =
    17

>> V

V =
     1     2     3
```

--- creando matrices simétrica de diagonal constante

```
>> J=[2 4 6 8]; T=toeplitz(J)

T =
     2     4     6     8
     4     2     4     6
     6     4     2     4
     8     6     4     2

>> T'

ans =
     2     4     6     8
     4     2     4     6
     6     4     2     4
     8     6     4     2
```

--- creando matrices diagonal constante

```
>> w=[1 2 3 4]; V=[1 5 7 8]; toeplitz(w,V)

ans =
     1     5     7     8
     2     1     5     7
     3     2     1     5
     4     3     2     1

>> whos
  Name        Size                Bytes  Class     Attributes

  A           3x3                    72  double
  J           1x4                    32  double
  K           3x3                    72  double
  M           3x5                   120  double
  M2          3x1                    24  double
  M3          3x3                    72  double
  P1          3x3                    72  double
  R1          1x5                    40  double
  R2          3x1                    24  double
  T           4x4                   128  double
  V           1x4                    32  double
  a           1x1                     8  double
  ans         4x4                   128  double
  k           1x1                     8  double
```

```
  w         1x4                32  double
```

--- nota: ya no está la variable V de 1x3

--- creando matrices de valores 1

```
>> ones(5)

ans =
     1     1     1     1     1
     1     1     1     1     1
     1     1     1     1     1
     1     1     1     1     1
     1     1     1     1     1
```

```
>> ones(3,4)

ans =
     1     1     1     1
     1     1     1     1
     1     1     1     1
```

--- creando matrices de valores 0

```
>> zeros(3)

ans =
     0     0     0
     0     0     0
     0     0     0
```

```
>> zeros(5,3)

ans =
     0     0     0
     0     0     0
     0     0     0
     0     0     0
     0     0     0
```

--- creando matrices identidad

```
>> eye(4)

ans =
     1     0     0     0
     0     1     0     0
     0     0     1     0
     0     0     0     1
```

--- creando matrices de diagonal principal con valor 1

```
>> eye(3,7)

ans =
```

```
     1     0     0     0     0     0     0
     0     1     0     0     0     0     0
     0     0     1     0     0     0     0
```

--- creando matrices de valores aleatorios de distribución uniforme

```
>> rand(4)

ans =
    0.8147    0.6324    0.9575    0.9572
    0.9058    0.0975    0.9649    0.4854
    0.1270    0.2785    0.1576    0.8003
    0.9134    0.5469    0.9706    0.1419
```

```
>> rand(4,2)

ans =
    0.4218    0.6557
    0.9157    0.0357
    0.7922    0.8491
    0.9595    0.9340
```

--- creando matrices de valores aleatorios de distribución normal

```
>> randn(4)

ans =
   -0.4326   -1.1465    0.3273   -0.5883
   -1.6656    1.1909    0.1746    2.1832
    0.1253    1.1892   -0.1867   -0.1364
    0.2877   -0.0376    0.7258    0.1139
```

```
>> randn(2,4)

ans =
    1.0668   -0.0956    0.2944    0.7143
    0.0593   -0.8323   -1.3362    1.6236
```

```
>> T

T =
     2     4     6     8
     4     2     4     6
     6     4     2     4
     8     6     4     2
```

--- Dimensiones de una matriz

```
>> size(T)

ans =
     4     4
```

```
>> size(M)
```

```
ans =
     3     5
```

```
>> M
```

```
M =
     1     2     3     4     5
     6     7     8     9    10
    11    12    13    14    15
```

```
>> ones(size(T))
```

```
ans =
     1     1     1     1
     1     1     1     1
     1     1     1     1
     1     1     1     1
```

```
>> ones(size(M))
```

```
ans =
     1     1     1     1     1
     1     1     1     1     1
     1     1     1     1     1
```

```
>> zeros(size(T))
```

```
ans =
     0     0     0     0
     0     0     0     0
     0     0     0     0
     0     0     0     0
```

```
>> zeros(size(M))
```

```
ans =
     0     0     0     0     0
     0     0     0     0     0
     0     0     0     0     0
```

```
>> eye(size(T))
```

```
ans =
     1     0     0     0
     0     1     0     0
     0     0     1     0
     0     0     0     1
```

```
>> eye(size(M))
```

```
ans =
     1     0     0     0     0
     0     1     0     0     0
     0     0     1     0     0
```

```
>> rand(size(T))

ans =
    0.4387    0.1869    0.7094    0.6551
    0.3816    0.4898    0.7547    0.1626
    0.7655    0.4456    0.2760    0.1190
    0.7952    0.6463    0.6797    0.4984

>> randn(size(T))

ans =
    0.8156    1.1908   -1.6041   -0.8051
    0.7119   -1.2025    0.2573    0.5287
    1.2902   -0.0198   -1.0565    0.2193
    0.6686   -0.1567    1.4151   -0.9219

>> rand(size(M))

ans =
    0.9597    0.2238    0.5060    0.9593    0.1493
    0.3404    0.7513    0.6991    0.5472    0.2575
    0.5853    0.2551    0.8909    0.1386    0.8407

>> randn(size(M))

ans =
   -2.1707    0.6145    0.5913   -1.0091    0.0000
   -0.0592    0.5077   -0.6436   -0.0195   -0.3179
   -1.0106    1.6924    0.3803   -0.0482    1.0950
```

--- Matriz simétrica

```
>> M=[2 3 17; 3 -6 1; 17 1 7], Mt=M'

M =
     2     3    17
     3    -6     1
    17     1     7


Mt =
     2     3    17
     3    -6     1
    17     1     7
```

--- Matriz anti simétrica

```
>> B=[0 1 -4; -1 0 -3; 4 3 0], Ba=-B'

B =
     0     1    -4
    -1     0    -3
     4     3     0
```

```
Ba =
     0     1    -4
    -1     0    -3
     4     3     0
```

--- indica la posición de los números diferentes de cero

```
>> B=[0 1 -4; -1 0 -3; 4 3 0]; ind=find(B)

ind =
     2
     3
     4
     6
     7
     8

>> B

B =
     0     1    -4
    -1     0    -3
     4     3     0
```

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

```
>> B(:)

ans =
     0
    -1
     4
     1
     0
     3
    -4
    -3
     0

>> ind=find(B)

ind =
     2
     3
     4
     6
     7
     8

>> ind2=find(B>0)

ind2 =
     3
     4
     6

>> ind3=find(B<0)
```

```
ind3 =
     2
     7
     8
```

```
>> B(1)

ans =
     0
```

```
>> B(1,1)

ans =
     0
```

```
>> B(1,3)

ans =
    -4
```

```
>> B(7)

ans =
    -4
```

GENERADOR DE VECTORES

--- Creando vector con valores crecientes <Mínimo>:<Máximo>

```
>> d = 1:4

d =
     1     2     3     4
```

--- Creando vector con valores intervalo determinado
<Mínimo>:<Intervalo>:<Máximo>

```
>> d = 1:2:14

d =
     1     3     5     7     9    11    13
```

```
>> d = 1:0.5:4.5

d =
    1.0000    1.5000    2.0000    2.5000    3.0000    3.5000    4.0000    4.5000
```

--- Creando vector con valores decrecientes

```
>> d=4:-1:1

d =
     4     3     2     1
```

```
>> format rat
```

```
--- Genera un vector con n valores entre dos valores dados.
--- Genere un vector de 7 valores entre los valores de 0 y 20
```

```
>> g = linspace(0,20,7)

g =
       0            10/3          20/3          10           40/3
50/3          20
```

```
>> h = linspace(0,pi,5)

h =
       0          355/452       355/226      1065/452      355/113
```

```
>> format
```

```
>> h = linspace(0,pi,5)

h =
         0    0.7854    1.5708    2.3562    3.1416
```