

# Introducció a Matlab

## Vectors

M'encanten els vectors i el Matlab, és la millor eina que he utilitzat mai.

```
x = [1 2 3 4 5] % vector fila
```

```
x = 1x5  
    1     2     3     4     5
```

```
y = [5;6;7;8;9] % vector columna (normal de crear)
```

```
y = 5x1  
     5  
     6  
     7  
     8  
     9
```

```
z = x' % trasposta
```

```
z = 5x1  
     1  
     2  
     3  
     4  
     5
```

```
w = 1:1:5 % inici:pas:fi
```

```
w = 1x5  
     1     2     3     4     5
```

```
q = zeros([1 5]) % matriu de zeros 1x5
```

```
q = 1x5  
     0     0     0     0     0
```

```
k = ones([5 1]) % matriu de uns 5x1
```

```
k = 5x1  
     1  
     1  
     1  
     1  
     1
```

```
x*y % producte escalar
```

```
ans = 115
```

```
norm(x) % mòdul d'un vector
```

```
ans = 7.4162
```

```
x*x'% mòdul al quadrat
```

```
ans = 55
```

```
norm(x)^2 % mòdul al quadrat
```

```
ans = 55
```

```
x(3)
```

```
ans = 3
```

```
y(2)
```

```
ans = 6
```

## Matrius

```
X = [1 2 3;4 5 6;6 7 8]
```

```
X = 3×3
```

```
1    2    3
4    5    6
6    7    8
```

```
X(2,3) % (fila,columna)
```

```
ans = 6
```

```
size(x)
```

```
ans = 1×2
```

```
1    5
```

```
[files columnes] = size(X)
```

```
files = 3
```

```
columnes = 3
```

```
ndims(X) % si poso ; al final, no imprimeix el resultat
```

```
ans = 2
```

```
ndims(X);
```

```
% concatenar matriu
```

```
Y = [X; X]
```

```
Y = 6×3
```

```
1    2    3
4    5    6
6    7    8
1    2    3
4    5    6
6    7    8
```

```
Z = [X X; X X]
```

```
Z = 6×6
```

```
1    2    3    1    2    3
4    5    6    4    5    6
6    7    8    6    7    8
1    2    3    1    2    3
```

4	5	6	4	5	6
6	7	8	6	7	8

```
Z(Z == 6) = -1 % if (value == 6) then value = -1
```

Z = 6×6

1	2	3	1	2	3
4	5	-1	4	5	-1
-1	7	8	-1	7	8
1	2	3	1	2	3
4	5	-1	4	5	-1
-1	7	8	-1	7	8

```
Z(Z < 3) = 0
```

Z = 6×6

0	0	3	0	0	3
4	5	0	4	5	0
0	7	8	0	7	8
0	0	3	0	0	3
4	5	0	4	5	0
0	7	8	0	7	8

```
% Z(Z ~= 0) = 1 % valors diferents a 0 = 1
```

```
Z(1:2,1:end) = 10 % (filaIni:filaFi,columnaIni:columnaFi)
```

Z = 6×6

10	10	10	10	10	10
10	10	10	10	10	10
0	7	8	0	7	8
0	0	3	0	0	3
4	5	0	4	5	0
0	7	8	0	7	8

```
% Z(:,4) = [] % esborrar la quarta columna (:) totes les files
```

```
Y = Z(4:end,3:end) % retallar
```

Y = 3×4

3	0	0	3
0	4	5	0
8	0	7	8

## Plots

```
x = 1:1:100
```

x = 1×100

1	2	3	4	5	6	7	8	9	10	11	12	13 ...
---	---	---	---	---	---	---	---	---	----	----	----	--------

```
y = sqrt(x)
```

y = 1×100

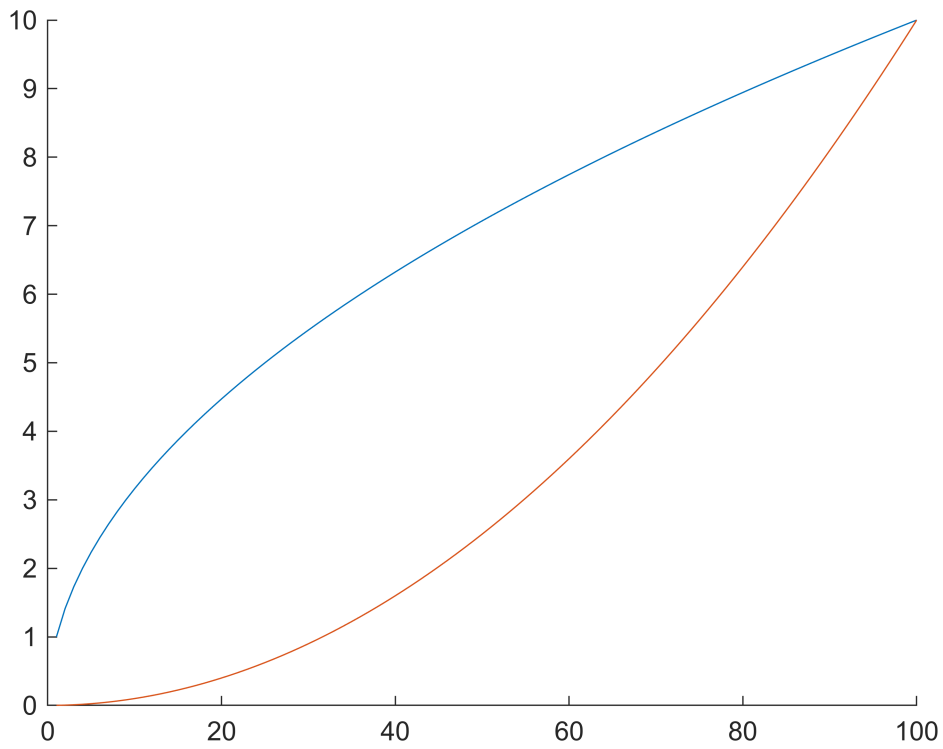
1.0000	1.4142	1.7321	2.0000	2.2361	2.4495	2.6458	2.8284 ...
--------	--------	--------	--------	--------	--------	--------	------------

```
z = x.*x/1000 % multiplicació element a element de les matrius
```

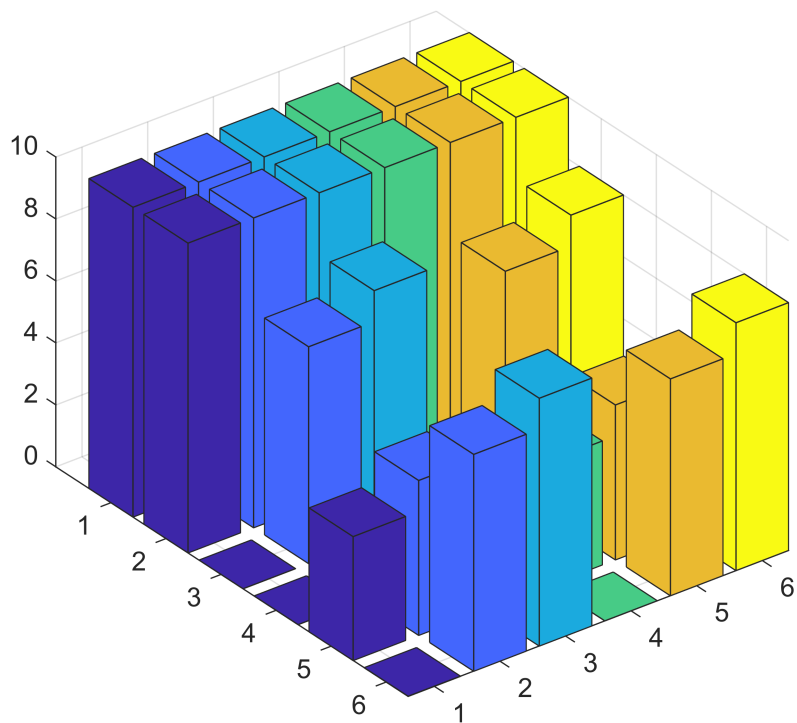
z = 1×100

0.0010	0.0040	0.0090	0.0160	0.0250	0.0360	0.0490	0.0640 ...
--------	--------	--------	--------	--------	--------	--------	------------

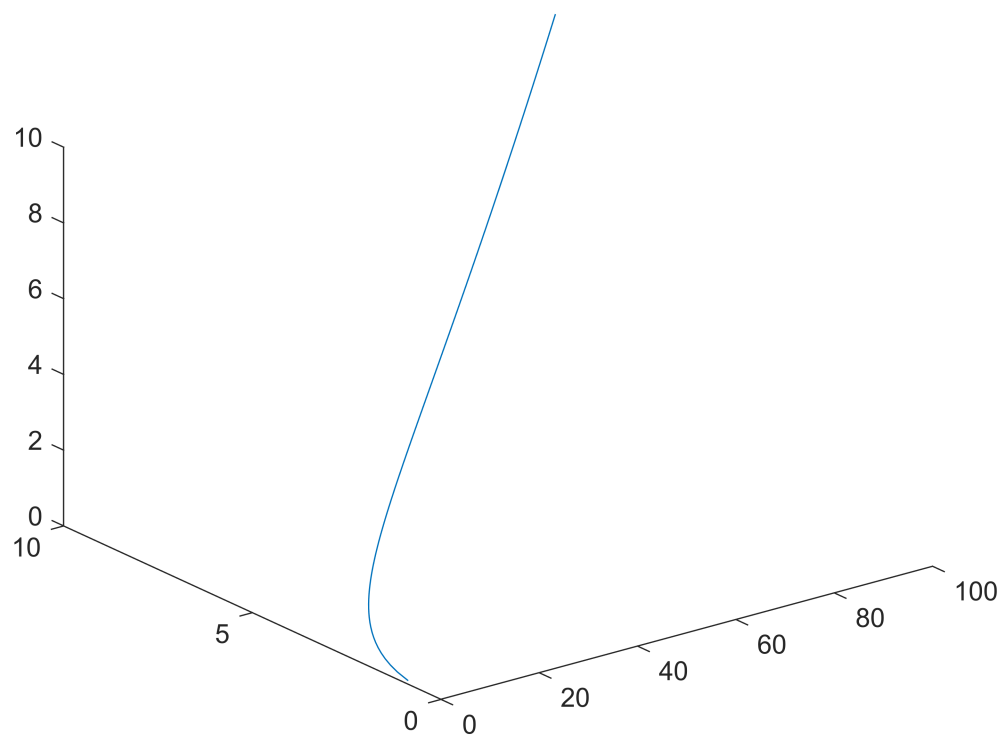
```
hold on % per combinar plors
plot(x,y)
plot(x,z)
hold off
```



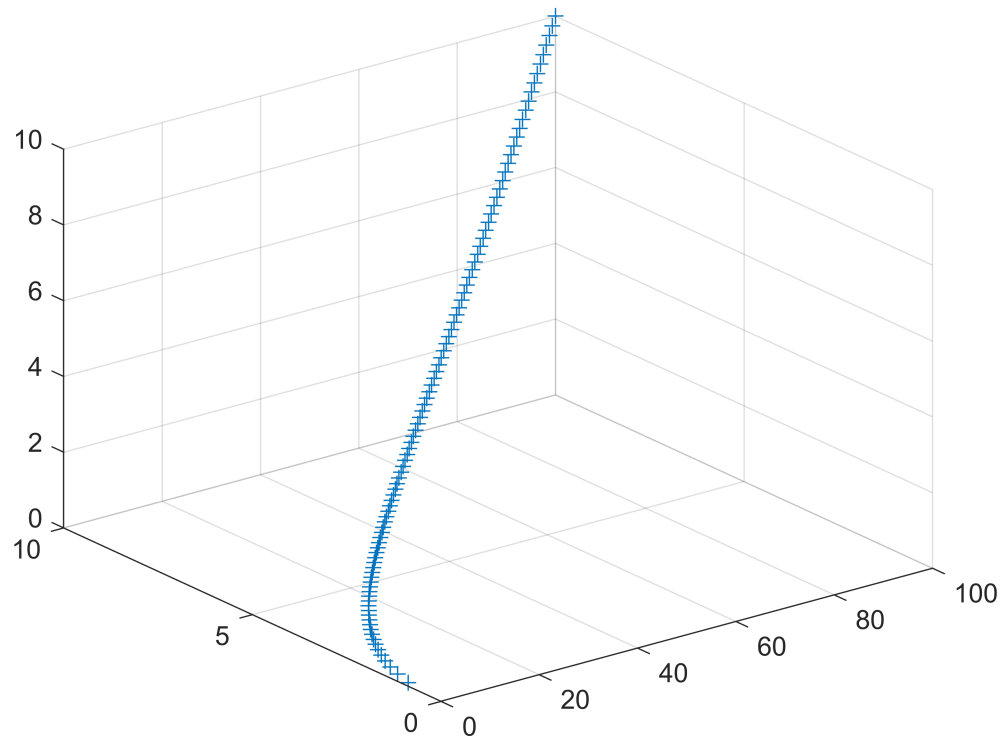
bar3(Z)



`plot3(x,y,z)`



```
scatter3(x,y,z, '+')
```



## Funcions bàsiques

Z

Z = 6x6

10	10	10	10	10	10
10	10	10	10	10	10
0	7	8	0	7	8
0	0	3	0	0	3
4	5	0	4	5	0
0	7	8	0	7	8

```
% Z= rand([10 10]) % matriu 10x10 amb valors random entre 0..1
```

```
mc = max(Z) % màxim de cada columna
```

mc = 1x6

10	10	10	10	10	10
----	----	----	----	----	----

```
m = max(max(Z)) % màxim de tota la matriu
```

m = 10

```
Z(Z < .5) = 0 % .5 == 0.5
```

Z = 6x6

10	10	10	10	10	10
10	10	10	10	10	10
0	7	8	0	7	8

0	0	3	0	0	3
4	5	0	4	5	0
0	7	8	0	7	8

```
Z(Z >= .5) = 1
```

```
Z = 6x6
```

1	1	1	1	1	1
1	1	1	1	1	1
0	1	1	0	1	1
0	0	1	0	0	1
1	1	0	1	1	0
0	1	1	0	1	1

```
s = sum(Z) % suma per columnes
```

```
s = 1x6
```

3	5	5	3	5	5
---	---	---	---	---	---

```
s = sum(sum(Z)) % suma de tots els valors (nombre d'uns de la matriu en aquest cas)
```

```
s = 26
```

```
% mesura del temps de càlcul
```

```
x = rand([10000 1])
```

```
x = 10000x1
```

```
0.8137
0.3189
0.2318
0.7268
0.2267
0.3261
0.1415
0.2737
0.8823
0.9008
⋮
```

```
tic
```

```
e = x'*x
```

```
e = 3.2991e+03
```

```
toc
```

```
Elapsed time is 0.010547 seconds.
```

## Funcions pròpies

```
x = 1:1:100
```

```
x = 1x100
```

1	2	3	4	5	6	7	8	9	10	11	12	13 ...
---	---	---	---	---	---	---	---	---	----	----	----	--------

```
% Creem un New Function, myfunction.m, amb el següent contingut:
```

```
%function [y] = myfunction(x)
```

```

    %y = x'*x
%end
q = myfunction(x)

```

```

y = 100x100
    1     2     3     4     5     6     7     8     9    10    11    12    13 ...
    2     4     6     8    10    12    14    16    18    20    22    24    26
    3     6     9    12    15    18    21    24    27    30    33    36    39
    4     8    12    16    20    24    28    32    36    40    44    48    52
    5    10    15    20    25    30    35    40    45    50    55    60    65
    6    12    18    24    30    36    42    48    54    60    66    72    78
    7    14    21    28    35    42    49    56    63    70    77    84    91
    8    16    24    32    40    48    56    64    72    80    88    96   104
    9    18    27    36    45    54    63    72    81    90    99   108   117
   10    20    30    40    50    60    70    80    90   100   110   120   130
    :
    :

```

```

q = 100x100
    1     2     3     4     5     6     7     8     9    10    11    12    13 ...
    2     4     6     8    10    12    14    16    18    20    22    24    26
    3     6     9    12    15    18    21    24    27    30    33    36    39
    4     8    12    16    20    24    28    32    36    40    44    48    52
    5    10    15    20    25    30    35    40    45    50    55    60    65
    6    12    18    24    30    36    42    48    54    60    66    72    78
    7    14    21    28    35    42    49    56    63    70    77    84    91
    8    16    24    32    40    48    56    64    72    80    88    96   104
    9    18    27    36    45    54    63    72    81    90    99   108   117
   10    20    30    40    50    60    70    80    90   100   110   120   130
    :
    :

```