Introducció al Matlab

Vectors

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

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

```
y = [5;6;7;8;9] % vector columna
```

```
y = 5×1
     5
     6
     7
     8
     9
```

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

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

```
a = 1:1:5 % de 1 a 5 de 1 a 1
```

```
a = 1×5
     1     2     3     4     5
```

```
b = zeros([1 5])
```

```
b = 1×5
     0     0     0     0     0
```

```
c = ones([5 1])
```

```
c = 5×1
     1
     1
     1
     1
     1
```

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

```
ans = 115
```

```
norm(x) % ||x||^2 = x * x'
```

```
ans = 7.4162
```

```
x*x'
```

```
ans = 55
```

```
norm(x)^2
```

```
ans = 55
```

```
x(1) % primer element no és la pos 0
```

```
ans = 1
```

```
lala = 1+2; % ';' no printa
```

Matrius

```
X = [ 1 2 3; 4 5 6; 7 8 9 ]
```

```
X = 3×3
     1     2     3
     4     5     6
     7     8     9
```

```
X(2,3) % files, columnes (des de 1)
```

```
ans = 6
```

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

```
files = 3
columnes = 3
```

```
ndims(X)
```

```
ans = 2
```

```
% concatenar matrius
Y = [X X]
```

```
Y = 3×6
     1     2     3     1     2     3
     4     5     6     4     5     6
     7     8     9     7     8     9
```

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

```
Z = 6×6
     1     2     3     1     2     3
     4     5     6     4     5     6
     7     8     9     7     8     9
     1     2     3     1     2     3
     4     5     6     4     5     6
     7     8     9     7     8     9
```

```
ndims(Z)
```

```
ans = 2
```

```
Z( Z==6 ) = -1
```

```
Z = 6×6
     1     2     3     1     2     3
     4     5    -1     4     5    -1
     7     8     9     7     8     9
```

```
     1     2     3     1     2     3
     4     5    -1     4     5    -1
     7     8     9     7     8     9
```

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

```
Z = 6×6
     0     0     3     0     0     3
     4     5     0     4     5     0
     7     8     9     7     8     9
     0     0     3     0     0     3
     4     5     0     4     5     0
     7     8     9     7     8     9
```

```
%Z(Z ~= 0) = 1

Z(1:2,1:end) = 10 % fila 1 (si es posa : es un rang de files), de la pos 1 fins end
```

```
Z = 6×6
    10    10    10    10    10    10
    10    10    10    10    10    10
     7     8     9     7     8     9
     0     0     3     0     0     3
     4     5     0     4     5     0
     7     8     9     7     8     9
```

```
%Z(:,4) = [] % esborra
Y = Z(4:end,3:end) % agafa una selecció
```

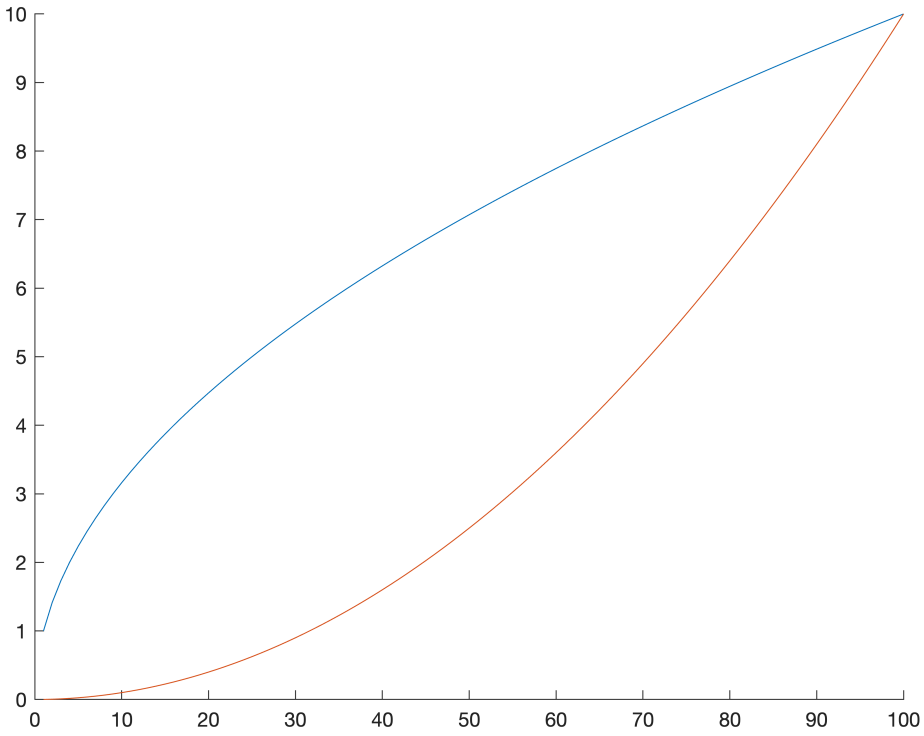
```
Y = 3×4
     3     0     0     3
     0     4     5     0
     9     7     8     9
```

Plots

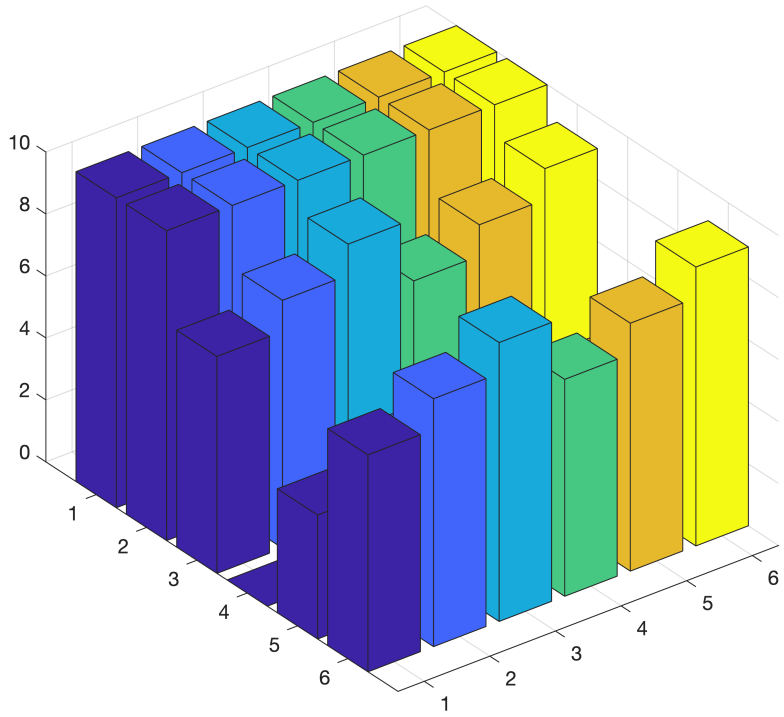
```
x = 1:1:100;
y = sqrt(x);
%z = pow2(x);
z = x.*x/1000 % mult element a element
```

```
z = 1×100
    0.0010    0.0040    0.0090    0.0160    0.0250    0.0360    0.0490    0.0640 ···
```

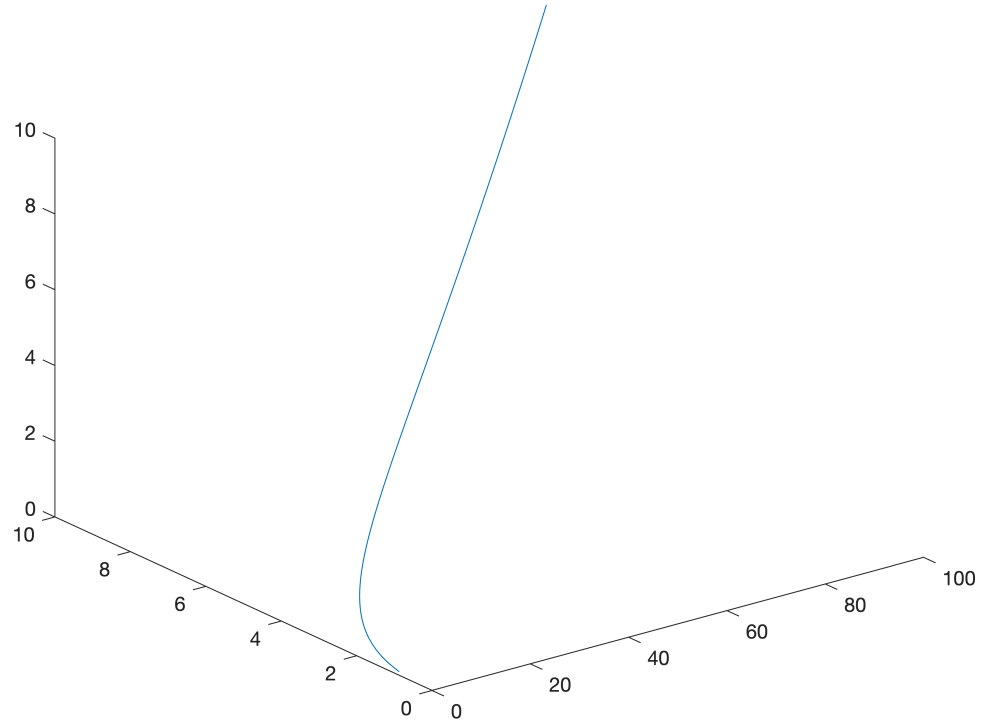
```
hold on
plot(x,y)
plot(x,z)
hold off
```


10
9
8
7
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70
80
90
100

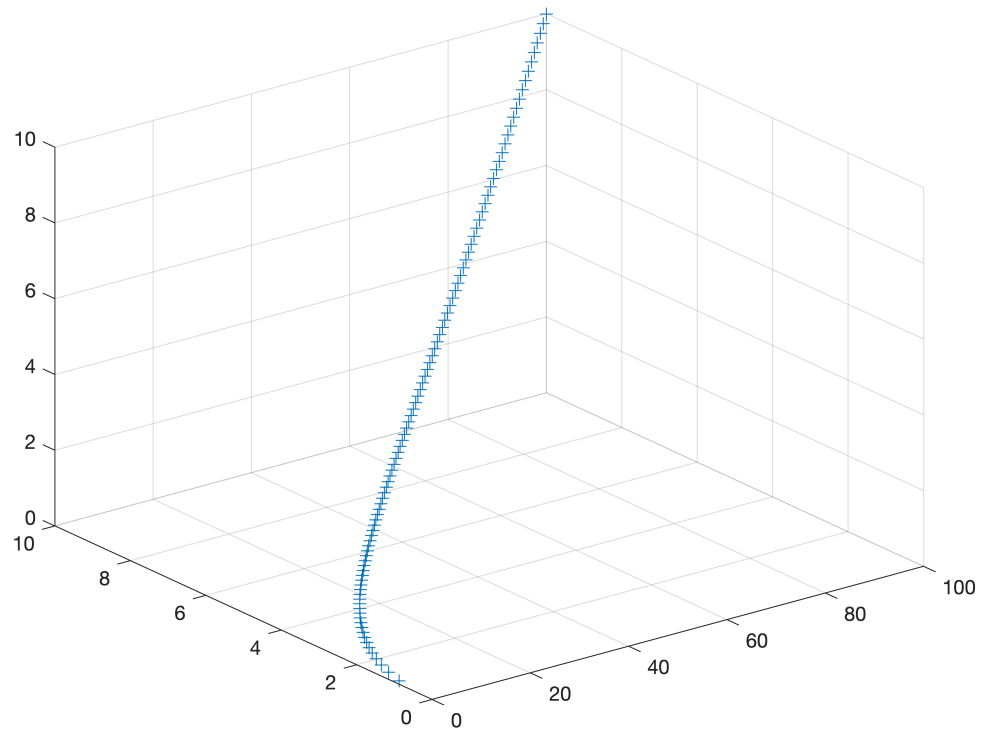
```
bar3(Z)
```


10
8
6
4
2
0
1
2
3
4
5
6
1
2
3
4
5
6

```
plot3(x,y,z)
```




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



Funcions bàsiques

```
Z = rand([10 10]);
m_cols = max(Z) % fa màxim per columnes
```

```
m_cols = 1×10
    0.7943    0.9961    0.9619    0.9106    0.8530    0.9448    0.9561    0.8212 ···
```

```
m = max(max(Z)) % màxim total
```

```
m = 0.9961
```

```
Z( Z<.5) = 0;
Z(Z >= .5) = 1;
Z
```

```
Z = 10×10
     0     0     0     0     1     0     1     0     1     1
     1     0     1     1     1     0     0     0     0     1
     0     0     0     0     0     1     0     1     1     0
     1     1     1     0     1     1     0     0     0     0
     0     0     1     0     0     0     0     0     1     0
     1     1     1     0     0     0     0     0     0     0
     0     1     0     1     0     0     1     1     0     1
     1     1     0     1     0     1     1     1     1     1
     1     0     0     1     0     0     1     1     1     1
     1     0     1     0     0     0     0     0     0     1
```

```
s = sum(Z) % sumes per cols
```

```
s = 1×10
```

```
     6     4     5     4     3     3     4     4     5     6
```

```
s = sum(sum(Z)) % suma de tot els valors (en aquest cas els 1)
```

```
s = 44
```

```
% mesura del temps de càlcul
x = rand([100000000 1])
```

```
x = 100000000×1
    0.6443
    0.3786
    0.8116
    0.5328
    0.3507
    0.9390
    0.8759
    0.5502
    0.6225
    0.5870
     ⋮
```

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

```
e = 3.3329e+07
```

```
toc
```

```
Elapsed time is 0.022209 seconds.
```

Funcions propies

```
x = 1:1:100;
q = prod_escalar(x)
```

```
y = 338350
q = 338350
```