

# Identificazione dei Modelli e Analisi dei Dati

## Esercitazione 1: comandi di base 23 maggio 2007

### Operazioni di base con i numeri

1)  $3 + 5$

ans =

8

2)  $3 - 5$

ans =

-2

3)  $2 * 7$

ans =

14

4)  $2 * -7$

ans =

-14

5)  $2 * 0$

ans =

0

6)  $6 / 2$

ans =

3

7)  $2 / 6$

ans =

0.3333

8)  $0 / 10$

ans =

0

9)  $10 / 0$

Warning: Divide by zero.

ans =

Inf

10)  $-10 / 0$

Warning: Divide by zero.

ans =

-Inf

11)  $0 / 0$

Warning: Divide by zero.

ans =

NaN

12)  $4^2$

ans =

16

13)  $-4^2$

ans =

-16

14)  $(-4)^2$

ans =

16

15)  $25^{0.5}$

ans =

5

16) `sqrt(25)`

ans =

5

17) `sqrt(-25)`

ans =

0 + 5.0000i

```
18) a = 12 * 3
```

```
a =  
    36
```

```
19) clear a
```

```
20) clear ans
```

## Creazione di vettori

```
1) [ 1 2 3 ]
```

```
ans =  
     1     2     3
```

```
2) [1 2 3]'
```

```
ans =  
     1  
     2  
     3
```

```
3) x = [ 1 2 3 ]
```

```
x =  
     1     2     3
```

```
4) [ 1 2 3 ...  
    7 8 9 ]
```

```
ans =  
     1     2     3     7     8     9
```

```
5) x = 1 : 10
```

```
x =  
Columns 1 through 6  
     1     2     3     4     5     6  
Columns 7 through 10  
     7     8     9     10
```

```
6) length(x)
```

```
ans =  
    10
```

```
7) x = 1 : 0.5 : 10
```

```
x =  
Columns 1 through 4  
    1.0000    1.5000    2.0000    2.5000
```

```
Columns 5 through 8  
    3.0000    3.5000    4.0000    4.5000
```

```
Columns 9 through 12  
    5.0000    5.5000    6.0000    6.5000
```

```
Columns 13 through 16  
    7.0000    7.5000    8.0000    8.5000
```

```
Columns 17 through 19  
    9.0000    9.5000   10.0000
```

```
8) x = [ 1 : 0.5 : 10 ]
```

```
x =  
Columns 1 through 4  
    1.0000    1.5000    2.0000    2.5000  
Columns 5 through 8  
    3.0000    3.5000    4.0000    4.5000  
Columns 9 through 12  
    5.0000    5.5000    6.0000    6.5000  
Columns 13 through 16  
    7.0000    7.5000    8.0000    8.5000  
Columns 17 through 19  
    9.0000    9.5000   10.0000
```

## Creazione di matrici

```
1) A = [ 1 2 3; 4 5 6 ]
```

```
A =  
     1     2     3  
     4     5     6
```

```
2) size(A)
```

```
ans =  
     2     3
```

```
3) A = [ 1 2 3; 4 5 6 ];
```

```
4) Z = zeros(2, 3)
```

```
Z =  
     0     0     0  
     0     0     0
```

5) **Z = zeros(2)**

Z =

```
0 0
0 0
```

6) **U = ones(3, 4)**

U =

```
1 1 1 1
1 1 1 1
1 1 1 1
```

7) **I = eye(5)**

I =

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

8) **I(:, 2)**

ans =

```
0
1
0
0
0
```

9) **I(2, :)**

ans =

```
0 1 0 0 0
```

10) **I(1, 1)**

ans =

```
1
```

11) **A**

A =

```
1 2 3
4 5 6
```

12) **Y = [ 7 8 9 ];**

13) **B = [ A; Y ]**

B =

```
1 2 3
4 5 6
7 8 9
```

14) **Y = [ 7 8 9 10 ];**

15) **B = [ A; Y ]**

??? Error using ==> vertcat

All rows in the bracketed expression must have the same number of columns.

## Operazioni con vettori e matrici

1) **x = [ 1 2 3 ]**

x =

```
1 2 3
```

2) **xt = x'**

xt =

```
1
2
3
```

3) **v = [ 1 2 3 4 5 6 ]**

v =

```
1 2 3 4 5 6
```

4) **w = [ 7 8 9 10 11 12 ]**

w =

```
7 8 9 10 11 12
```

5) **v .\* w**

ans =

```
7 16 27 40 55 72
```

6) **v = [ 1 0 -2 ]**

v =

```
1 0 -2
```

7) **w = [ 4 -11 1 ]**

w =

```
4 -11 1
```

8) **v \* w'**

ans =

```
2
```

9) **A = [ 1 2 3; 4 5 6 ]**

A =

```
1 2 3
```

```

      4      5      6
10)  A'
ans =
      1      4
      2      5
      3      6
11)  C = A'
C =
      1      4
      2      5
      3      6
12)  C'
ans =
      1      2      3
      4      5      6
13)  [ 5 6 7; 1 2 3 ] + [ 3 3 3; 4 4 4 ]
ans =
      8      9      10
      5      6      7
14)  [5 6 7; 1 2 3] + [3 3 3 4; 4 4 4 3]
??? Error using ==> +
Matrix dimensions must agree.
15)  [ 1 0 2 ] - 5
ans =
     -4     -5     -3
16)  [ 1 2; 3 4; 5 6 ] * [ 4 4; 5 5 ]
ans =
     14     14
     32     32
     50     50
17)  L = [ 1 2; 3 4; 5 6 ]
L =
      1      2
      3      4
      5      6
18)  R = [ 4 4; 5 5 ]
R =
      4      4
      5      5

```

```

19)  L * R
ans =
     14     14
     32     32
     50     50
20)  R = [ 4 4; 5 5; 6 6 ]
R =
      4      4
      5      5
      6      6
21)  L * R
??? Error using ==> *
Inner matrix dimensions must agree.
22)  A
A =
      1      2      3
      4      5      6
23)  A2 = A .^ 2
A2 =
      1      4      9
     16     25     36
24)  v
v =
      1      2      3      4      5      6
25)  w
w =
      7      8      9     10     11     12
26)  v ./ w
ans =
Columns 1 through 4
     0.1429     0.2500     0.3333     0.4000
Columns 5 through 6
     0.4545     0.5000
27)  A = [ 1 2 0; 0 4 2; 2 2 8 ]
A =
      1      2      0
      0      4      2
      2      2      8

```

```
28) b = [ 1 1 1 ]'
```

```
b =
```

```
1
1
1
```

```
29) x = inv(A) * b
```

```
x =
```

```
0.4444
0.2778
-0.0556
```

```
30) x = A \ b
```

```
x =
```

```
0.4444
0.2778
-0.0556
```

```
31) x = A / b
```

```
??? Error using ==> /
Matrix dimensions must agree.
```

```
32) det(A)
```

```
ans =
```

```
36
```

```
33) rank(A)
```

```
ans =
```

```
3
```

```
34) eig(A)
```

```
ans =
```

```
9.0000
2.0000
2.0000
```

```
35) A
```

```
A =
```

```
1 2 0
0 4 2
2 2 8
```

```
36) sqrt(A)
```

```
ans =
```

```
1.0000 1.4142 0
0 2.0000 1.4142
1.4142 1.4142 2.8284
```

```
37) clear all
```

## Istruzioni di grafica

```
1) x = -20 : .1 : 20;
```

```
2) y1 = x;
```

```
3) y2 = x.^2;
```

```
4) y3 = x.^3;
```

```
5) y4 = x.^4;
```

```
6) plot(x, y2);
```

```
7) grid on;
```

```
8) plot(x, y2, 'r');
```

```
9) plot(x, y2, 'r');
```

```
10) figure(1);
```

```
11) plot(x, y3, 'g');
```

```
12) xlabel('asse x');
```

```
13) ylabel('asse y');
```

```
14) title('x^3');
```

```
15) grid on;
```

```
16) figure(2);
```

```
17) subplot(2, 2, 1), plot(x, y1);
```

```
18) subplot(2, 2, 2), plot(x, y2);
```

```
19) subplot(2, 2, 3), plot(x, y3);
```

```
20) subplot(2, 2, 4), plot(x, y4);
```

```
21) subplot(2, 2, 3), xlabel('asse x'),
ylabel('asse y');
```

```
22) hold on;
```

```
23) plot(x, y4, 'm');
```

```
24) clear all
```

## Operazioni con dati casuali

```
1) xgauss = randn(1000, 1);
```

```
2) mean(xgauss)
```

```
ans =
```

```
-0.0431
```

```
3) median(xgauss)
```

```
ans =
```

```
-0.0131
```

```
4) std(xgauss)
```

```
ans =
```

```
0.9435
```

```
5) var(xgauss)
```

```
ans =
```

```
0.8902
```

```
6) u = randn(10, 2);
```

```
7) u
u =
    0.7160   -0.3017
    1.5986    0.9570
   -2.0647   -0.5334
   -0.7436   -0.9011
    0.1762   -0.8926
    0.5278    0.2787
   -0.5532   -0.7458
    0.2983    1.6035
   -1.2266    0.5743
   -0.1897    0.3207

8) mean(u, 1)
ans =
   -0.1461    0.0360

9) mean(u, 2)
ans =
    0.2071
    1.2778
   -1.2991
   -0.8224
   -0.3582
    0.4033
   -0.6495
    0.9509
   -0.3262
    0.0655

10) xunif = rand(1000, 2);
11) mean(xunif)
ans =
    0.5021    0.4993

12) cov(xunif)
ans =
    0.0837    0.0037
    0.0037    0.0854

13) var(xunif)
ans =
    0.0837    0.0854

14) figure(2);
15) hist(xgauss);
16) figure(1);
17) hist(xgauss, 50);

18) a = -10 : 10;
19) b = a + randn(1, length(a));
20) scatter(a, b)
```

```
21) clear all
```