

Class_Work_3

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General

```
clc, clear all, format compact
```

Matrix index

```
clc, clear all, format compact
A=[1 1 1 -2; 1,8 6 0; -1 2 5 8; 1 0 pi pi/3; 1 sin(pi/3) exp(2) 0]
a31=A(3,1)
a_2=A(:,2) %extract the 2nd column
a_odd=A([1 3 5],[1,3]) %extract every odd element from the matrix
```

```
A =
    1.00    1.00    1.00   -2.00
    1.00    8.00    6.00    0
   -1.00    2.00    5.00    8.00
    1.00     0    3.14    1.05
    1.00    0.87    7.39     0

a31 =
   -1.00

a_2 =
    1.00
    8.00
    2.00
     0
    0.87

a_odd =
    1.00    1.00
```

```

-1.00      5.00
 1.00      7.39

```

Replacing a value inside array

```

clc;
A=[1 1 1 -2; 1 8 6 0 ; -1 2 5 8 ; 1 0 pi pi/3; 1 sin(pi/3) exp(2) 0]
A(1,1)=-111
A(1)=-111
A(3,[1 3])=0
A(:,3)=100
A(:,3)=[100;100;100;100;100]

```

```

A =
    1.00    1.00    1.00   -2.00
    1.00    8.00    6.00    0
   -1.00    2.00    5.00    8.00
    1.00     0     3.14    1.05
    1.00    0.87    7.39    0

A =
  -111.00    1.00    1.00   -2.00
    1.00    8.00    6.00    0
   -1.00    2.00    5.00    8.00
    1.00     0     3.14    1.05
    1.00    0.87    7.39    0

A =
  -111.00    1.00    1.00   -2.00
    1.00    8.00    6.00    0
   -1.00    2.00    5.00    8.00
    1.00     0     3.14    1.05
    1.00    0.87    7.39    0

A =
  -111.00    1.00    1.00   -2.00
    1.00    8.00    6.00    0
     0     2.00     0     8.00
    1.00     0     3.14    1.05
    1.00    0.87    7.39    0

A =
  -111.00    1.00   100.00   -2.00
    1.00    8.00   100.00    0
     0     2.00   100.00    8.00
    1.00     0   100.00    1.05
    1.00    0.87   100.00    0

A =
  -111.00    1.00   100.00   -2.00
    1.00    8.00   100.00    0
     0     2.00   100.00    8.00
    1.00     0   100.00    1.05
    1.00    0.87   100.00    0

```

Expanding Matrice

If a value is assigned to an element beyond the original size of a matrix, Matlab will expand it, filling in zeros for any new elements whose values are not specified

```
A(7,8)=5
```

```

A =
Columns 1 through 7
  -111.00    1.00   100.00   -2.00    0    0
    1.00    8.00   100.00    0    0    0
     0     2.00   100.00    8.00    0    0
    1.00     0   100.00    1.05    0    0
    1.00    0.87   100.00    0    0    0
     0     0    0     0    0    0

```

```

0
0
0
0
0
0
0
5.00

```

Deleting Rows and Columns

```

A(3,:)=[]
A(:,6)=[]

```

```

A =
Columns 1 through 7
-111.00    1.00   100.00   -2.00    0    0
  1.00    8.00   100.00    0    0    0
  1.00    0    100.00    1.05    0    0
  1.00    0.87  100.00    0    0    0
  0    0    0    0    0    0
  0    0    0    0    0    0
Column 8
  0
  0
  0
  0
  0
  5.00
A =
-111.00    1.00   100.00   -2.00    0    0
  1.00    8.00   100.00    0    0    0
  1.00    0    100.00    1.05    0    0
  1.00    0.87  100.00    0    0    0
  0    0    0    0    0    0
  0    0    0    0    0    0

```

class assign_3- 1

```

clc
A_11=[1:7; 2:2:14; 21:-3:3;5:5:35]
B=A_11([1 3 4], 1:2:7)
u=[A_11(3,:),A_11(:,5)',A_11(:,7)']

```

```

A_11 =
  1.00    2.00    3.00    4.00    5.00    6.00
  2.00    4.00    6.00    8.00   10.00   12.00
 21.00   18.00   15.00   12.00    9.00    6.00
  5.00   10.00   15.00   20.00   25.00   30.00
B =
  1.00    3.00    5.00    7.00
 21.00   15.00    9.00    3.00
  5.00   15.00   25.00   35.00
u =
Columns 1 through 7
 21.00   18.00   15.00   12.00    9.00    6.00
Columns 8 through 14
  5.00   10.00    9.00   25.00    7.00   14.00
Column 15
 35.00

```

Special matrices

```

m=5, n=4

```

```

z1=zeros(m,n)
z2=zeros(n)
o1=ones(m,n)
o2=ones(m)
e1=eye(m,n)
e2=eye(n)
b=[5 6 7 8] % The main diagonal may be extracted (as a vector) using diag
d_b=diag(b)

```

```

m =
    5.00
n =
    4.00
z1 =
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
z2 =
    0    0    0    0
    0    0    0    0
    0    0    0    0
    0    0    0    0
o1 =
    1.00    1.00    1.00    1.00
    1.00    1.00    1.00    1.00
    1.00    1.00    1.00    1.00
    1.00    1.00    1.00    1.00
    1.00    1.00    1.00    1.00
o2 =
    1.00    1.00    1.00    1.00    1.00
    1.00    1.00    1.00    1.00    1.00
    1.00    1.00    1.00    1.00    1.00
    1.00    1.00    1.00    1.00    1.00
    1.00    1.00    1.00    1.00    1.00
e1 =
    1.00    0    0    0
    0    1.00    0    0
    0    0    1.00    0
    0    0    0    1.00
    0    0    0    0
e2 =
    1.00    0    0    0
    0    1.00    0    0
    0    0    1.00    0
    0    0    0    1.00
b =
    5.00    6.00    7.00    8.00
d_b =
    5.00    0    0    0
    0    6.00    0    0
    0    0    7.00    0
    0    0    0    8.00

```

class assign_3-2

```

clc
A=zeros (2,5)
B=eye(4)
C=ones (3,2)

```

```

A =
    0    0    0    0    0
    0    0    0    0    0
B =
    1.00    0    0    0
    0    1.00    0    0
    0    0    1.00    0

```

```

C =
    0         0         0         1.00
    1.00        1.00
    1.00        1.00
    1.00        1.00

```

sort array elements in asending or descending order

```

clc
d_row=[4 pi 0 1]
s1=sort(d_row)
s2=sort(d_row,'descend') % sorts the elements along the vector in descending order
s3=sort(A_11) % sorts the elements along each column in ascending order
s4=sort(A_11,2) % sorts the elements along each row in ascending order
s5=sort(A_11')' % The same

```

```

d_row =
    4.00        3.14         0         1.00
s1 =
         0         1.00        3.14        4.00
s2 =
    4.00        3.14         1.00         0
s3 =
    1.00        2.00        3.00        4.00        5.00        6.00
    2.00        4.00        6.00        8.00        9.00        6.00
    5.00       10.00       15.00       12.00       10.00       12.00
    21.00       18.00       15.00       20.00       25.00       30.00
s4 =
    1.00        2.00        3.00        4.00        5.00        6.00
    2.00        4.00        6.00        8.00       10.00       12.00
    3.00        6.00        9.00       12.00       15.00       18.00
    5.00       10.00       15.00       20.00       25.00       30.00
s5 =
    1.00        2.00        3.00        4.00        5.00        6.00
    2.00        4.00        6.00        8.00       10.00       12.00
    3.00        6.00        9.00       12.00       15.00       18.00
    5.00       10.00       15.00       20.00       25.00       30.00

```

reshape: B=reshape(A,m,n) returns the m by n matrix B whose elements are

```

%%taken column wise from A
clc
D=1:12
m=2,n=6
D1=reshape(D,m,n)
D2=reshape(D,n,[ ])'

```

```

D =
Columns 1 through 7
    1.00        2.00        3.00        4.00        5.00        6.00
Columns 8 through 12
    8.00        9.00       10.00       11.00       12.00
m =
    2.00
n =
    6.00
D1 =
    1.00        3.00        5.00        7.00        9.00       11.00
    2.00        4.00        6.00        8.00       10.00       12.00
D2 =
    1.00        2.00        3.00        4.00        5.00        6.00
    7.00        8.00        9.00       10.00       11.00       12.00

```

class assign_3- 3

```
clc
A=reshape(1:35,7,5) '
B=A(2:4,3:6)
```

```
A =
    1.00    2.00    3.00    4.00    5.00    6.00
    8.00    9.00   10.00   11.00   12.00   13.00
   15.00   16.00   17.00   18.00   19.00   20.00
   22.00   23.00   24.00   25.00   26.00   27.00
   29.00   30.00   31.00   32.00   33.00   34.00

B =
   10.00   11.00   12.00   13.00
   17.00   18.00   19.00   20.00
   24.00   25.00   26.00   27.00
```

Random numbers matrix

```
r1=rand(m,n)
r2=rand(m,n)*10
```

```
r1 =
    0.23    0.31    0.43    0.90    0.44    0.26
    0.44    0.92    0.18    0.98    0.11    0.41

r2 =
    5.95    6.03    2.22    2.97    4.24    0.86
    2.62    7.11    1.17    3.19    5.08    2.62
```

Random numbers from a to b

```
clc
a=5,b=7
r3=rand(m,n)*(b-a)+a
```

```
a =
    5.00

b =
    7.00

r3 =
    6.60    6.86    5.98    5.47    6.93    6.04
    5.06    6.46    6.16    5.92    6.09    5.46
```

Random integers from a to b

```
clc
r4=round(rand(m,n)*(b-a)+a)
```

```
r4 =
    6.00    6.00    6.00    5.00    7.00    5.00
    6.00    6.00    7.00    7.00    7.00    6.00
```

class assign_3- 4

```
clc
R=round(rand (1,6)*(15+7)-7)
R=sort(R,'descend')
```

```
R =
```

```

R =
    0    8.00   -4.00    9.00   -5.00    7.00
    9.00    8.00    7.00    0   -4.00   -5.00

```

sum

```

clc
d_row=[4 pi 1 0]
sum_s1=sum(d_row)
sum_B=sum(B) % sums the elements in each column
sum_B_r=sum(B,2) % sums the elements in each row
sum_B_r1=sum(B')'
sum_B_all=sum(sum(B)) %sums all the elements in the matrix

```

```

d_row =
    4.00    3.14    1.00    0
sum_s1 =
    8.14
sum_B =
    51.00    54.00    57.00    60.00
sum_B_r =
    46.00
    74.00
    102.00
sum_B_r1 =
    46.00
    74.00
    102.00
sum_B_all =
    222.00

```

use of :

```

sum_B_all_2=sum(B(:)) % the same

```

```

sum_B_all_2 =
    222.00

```

max

```

max_s1=max(d_row)
max_B=max(B)
max_B_r=max(B')'
max_B_r2=max(B,[],2) % finds the max element in each row
max_B_all=max(B(:))

```

```

max_s1 =
    4.00
max_B =
    24.00    25.00    26.00    27.00
max_B_r =
    13.00
    20.00
    27.00
max_B_r2 =
    13.00
    20.00
    27.00
max_B_all =
    27.00

```

mean

```

mean_s1=mean(d_row)
mean_B=mean(B)
mean_B_r=mean(B')'
mean_B_r2=mean(B,2)
mean_B_all=mean(B(:))

```

```

mean_s1 =
    2.04
mean_B =
    17.00    18.00    19.00    20.00
mean_B_r =
    11.50
    18.50
    25.50
mean_B_r2 =
    11.50
    18.50
    25.50
mean_B_all =
    18.50

```

class assign_3- 5

```

a11=ones(2,2)
a12=2*ones(2,3)
a21=3*ones(3,1)
a22=4*ones(3,2)
a23=5*ones(3,2)
A=[a11 a12; a21 a22 a23]

```

```

a11 =
    1.00    1.00
    1.00    1.00
a12 =
    2.00    2.00    2.00
    2.00    2.00    2.00
a21 =
    3.00
    3.00
    3.00
a22 =
    4.00    4.00
    4.00    4.00
    4.00    4.00
a23 =
    5.00    5.00
    5.00    5.00
    5.00    5.00
A =
    1.00    1.00    2.00    2.00    2.00
    1.00    1.00    2.00    2.00    2.00
    3.00    4.00    4.00    5.00    5.00
    3.00    4.00    4.00    5.00    5.00
    3.00    4.00    4.00    5.00    5.00

```

class assign_3- 7

```

clc
m1=reshape(1:4,2,2)'
m1(5,5)=5

```

```

m1 =
    1.00    2.00
    3.00    4.00

```



```
m1 =
```

1.00	2.00	0	0	0
3.00	4.00	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	5.00

class assign_3- 8

```
clc
A=ones (3)
B=5*(ones(2))
A(4:5,4:5)=B
A=ones(3) % another solution
A(4:5,4:5)=5
```

```
A =
```

1.00	1.00	1.00		
1.00	1.00	1.00		
1.00	1.00	1.00		

```
B =
```

5.00	5.00
5.00	5.00

```
A =
```

1.00	1.00	1.00	0	0
1.00	1.00	1.00	0	0
1.00	1.00	1.00	0	0
0	0	0	5.00	5.00
0	0	0	5.00	5.00

```
A =
```

1.00	1.00	1.00		
1.00	1.00	1.00		
1.00	1.00	1.00		

```
A =
```

1.00	1.00	1.00	0	0
1.00	1.00	1.00	0	0
1.00	1.00	1.00	0	0
0	0	0	5.00	5.00
0	0	0	5.00	5.00

class assign_3- 9

```
A=reshape ([1:8],4,2) '
A(3:4,1:2)=5
```

```
A =
```

1.00	2.00	3.00	4.00
5.00	6.00	7.00	8.00

```
A =
```

1.00	2.00	3.00	4.00
5.00	6.00	7.00	8.00
5.00	5.00	0	0
5.00	5.00	0	0

Published with MATLAB® 7.6