

1.

```
>> time = 1:10
```

```
time =
```

```
1 2 3 4 5 6 7 8 9 10
```

```
>> time = 1:0.25:10
```

```
time =
```

```
Columns 1 through 7
```

```
1.0000000000000000 1.2500000000000000 1.5000000000000000 1.7500000000000000 2.0000000000000000 2.2500000000000000 2.5000000000000000
```

```
Columns 8 through 14
```

```
2.7500000000000000 3.0000000000000000 3.2500000000000000 3.5000000000000000 3.7500000000000000 4.0000000000000000 4.2500000000000000
```

```
Columns 15 through 21
```

```
4.5000000000000000 4.7500000000000000 5.0000000000000000 5.2500000000000000 5.5000000000000000 5.7500000000000000 6.0000000000000000
```

```
Columns 22 through 28
```

```
6.2500000000000000 6.5000000000000000 6.7500000000000000 7.0000000000000000 7.2500000000000000 7.5000000000000000 7.7500000000000000
```

```
Columns 29 through 35
```

```
8.0000000000000000 8.2500000000000000 8.5000000000000000 8.7500000000000000 9.0000000000000000 9.2500000000000000 9.5000000000000000
```

```
Columns 36 through 37
```

```
9.7500000000000000 10.0000000000000000
```

```
>> y=sin(time)
```

```
y =
```

```
Columns 1 through 7
```

```
0.841470984807897 0.948984619355586 0.997494986604054 0.983985946873937 0.909297426825682 0.778073196887921 0.598472144103956
```

```
Columns 8 through 14
```

```
0.381660992052332 0.141120008059867 -0.108195134530108 -0.350783227689620 -0.571561318742344 -0.756802495307928 -0.894989358228583
```

```
Columns 15 through 21
```

```
-0.977530117665097 -0.999292788975378 -0.958924274663138 -0.858934493426592 -0.705540325570392 -0.508279077499258 -0.279415498198926
```

```
Columns 22 through 28
```

```
-0.033179216547557 0.215119988087816 0.450044073780618 0.656986598718789 0.823080879011506 0.937999976774739 0.994598779111176
```

```
Columns 29 through 35
```

```
0.989358246623382 0.922604210239340 0.798487112623490 0.624723953754192 0.412118485241757 0.173889485380434 -0.075151120461809
```

```
Columns 36 through 37
```

```
-0.319519193622274 -0.544021110889370
```

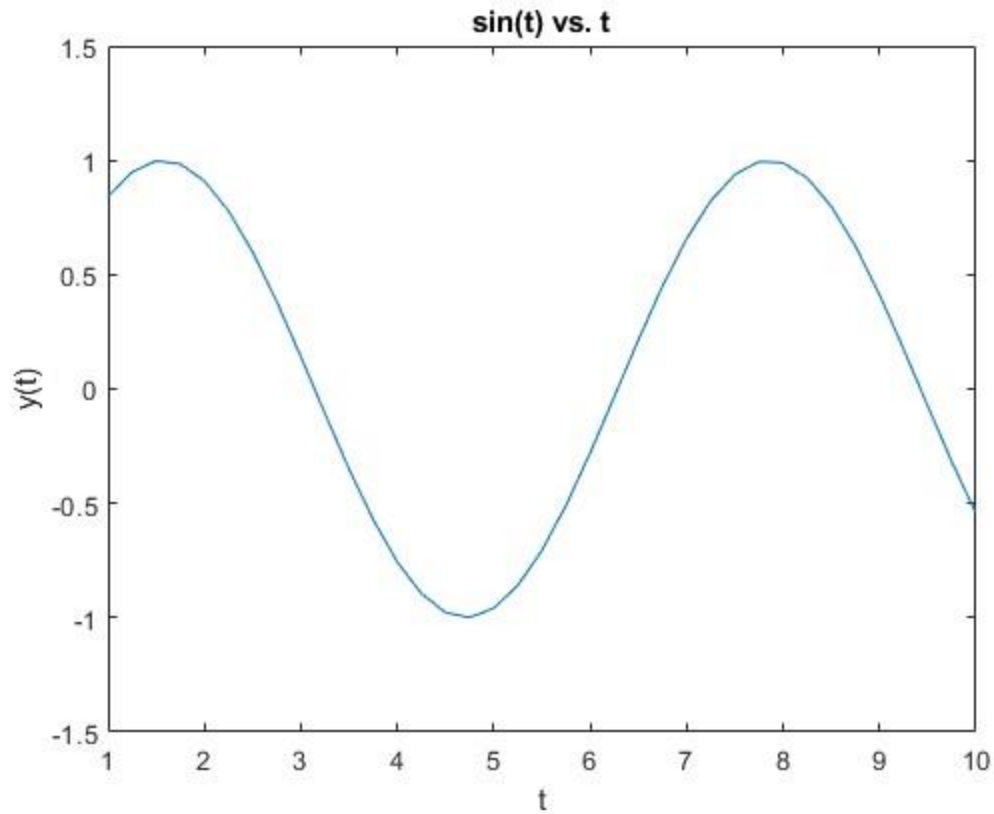
```
>> plot(time,y)
```

```
>> axis([1 10 -1.5 1.5])
```

```
>> xlabel('t')
```

```
>> ylabel('y(t)')
```

```
>> title('sin(t) vs. t')
```



```
>> clf
```

```
>> z = [sin(time) cos(time)]
```

```
z =
```

Columns 1 through 7

0.841470984807897 0.948984619355586 0.997494986604054 0.983985946873937 0.909297426825682 0.778073196887921 0.598472144103956

Columns 8 through 14

0.381660992052332 0.141120008059867 -0.108195134530108 -0.350783227689620 -0.571561318742344 -0.756802495307928 -0.894989358228583

Columns 15 through 21

-0.977530117665097 -0.999292788975378 -0.958924274663138 -0.858934493426592 -0.705540325570392 -0.508279077499258 -0.279415498198926

Columns 22 through 28

-0.033179216547557 0.215119988087816 0.450044073780618 0.656986598718789 0.823080879011506 0.937999976774739 0.994598779111176

Columns 29 through 35

0.989358246623382 0.922604210239340 0.798487112623490 0.624723953754192 0.412118485241757 0.173889485380434 -0.075151120461809

Columns 36 through 42

-0.319519193622274 -0.544021110889370 0.540302305868140 0.315322362395269 0.070737201667703 -0.178246055649492 -0.416146836547142

Columns 43 through 49

-0.628173622722739 -0.801143615546934 -0.924302378632464 -0.989992496600445 -0.994129676080546 -0.936456687290796 -0.820559357339561

Columns 50 through 56

-0.653643620863612 -0.446087489913793 -0.210795799430780 0.037602152887977 0.283662185463226 0.512085477241841 0.708669774291260

Columns 57 through 63

0.861192417161521 0.960170286650366 0.999449418224499 0.976587625728023 0.893006344689077 0.753902254343305 0.567924173288695

Columns 64 through 70

0.346635317835026 0.103794357219253 -0.145500033808614 -0.385747937452222 -0.602011902684824 -0.780845683605749 -0.911130261884677

Columns 71 through 74

-0.984765173467324 -0.997172156196378 -0.947579803977993 -0.839071529076452

>>

>> z = [sin(time)' cos(time)']

z =

0.841470984807897 0.540302305868140

0.948984619355586 0.315322362395269

0.997494986604054 0.070737201667703

0.983985946873937 -0.178246055649492

0.909297426825682 -0.416146836547142

0.778073196887921 -0.628173622722739

0.598472144103956 -0.801143615546934

0.381660992052332 -0.924302378632464

0.141120008059867 -0.989992496600445

-0.108195134530108 -0.994129676080546

-0.350783227689620 -0.936456687290796

-0.571561318742344 -0.820559357339561

-0.756802495307928 -0.653643620863612

-0.894989358228583 -0.446087489913793

-0.977530117665097 -0.210795799430780

-0.999292788975378 0.037602152887977

-0.958924274663138 0.283662185463226

-0.858934493426592 0.512085477241841

-0.705540325570392 0.708669774291260

-0.508279077499258 0.861192417161521

-0.279415498198926 0.960170286650366

-0.033179216547557 0.999449418224499

0.215119988087816 0.976587625728023

0.450044073780618 0.893006344689077

0.656986598718789 0.753902254343305

0.823080879011506 0.567924173288695

0.937999976774739 0.346635317835026

0.994598779111176 0.103794357219253

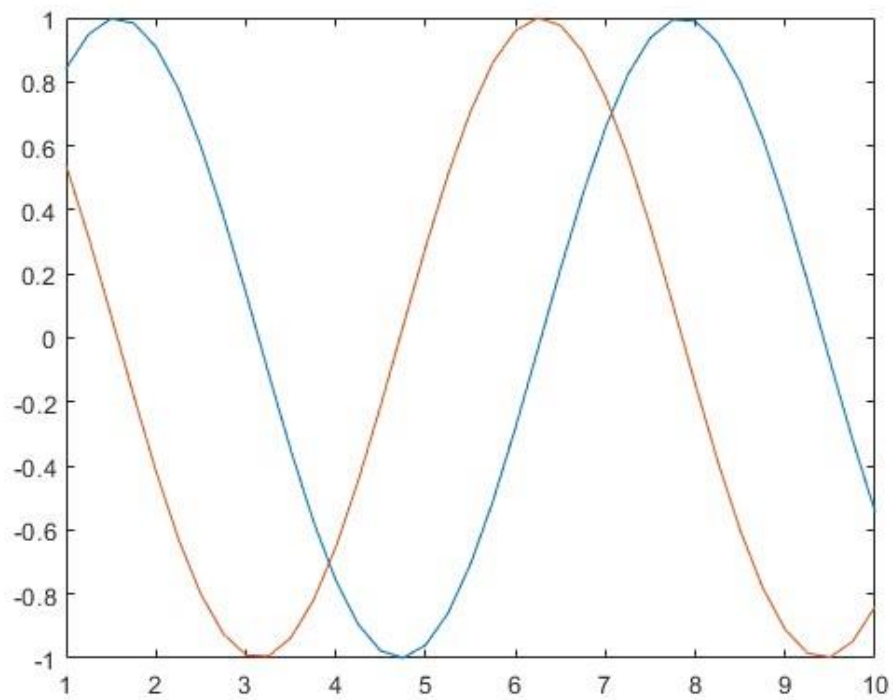
0.989358246623382 -0.145500033808614

```

0.922604210239340 -0.385747937452222
0.798487112623490 -0.602011902684824
0.624723953754192 -0.780845683605749
0.412118485241757 -0.911130261884677
0.173889485380434 -0.984765173467324
-0.075151120461809 -0.997172156196378
-0.319519193622274 -0.947579803977993
-0.544021110889370 -0.839071529076452

```

```
>> plot(time,z)
```



```

>> z(1,1)
ans =
    0.841470984807897

>> z(1,2)
ans =
    0.540302305868140

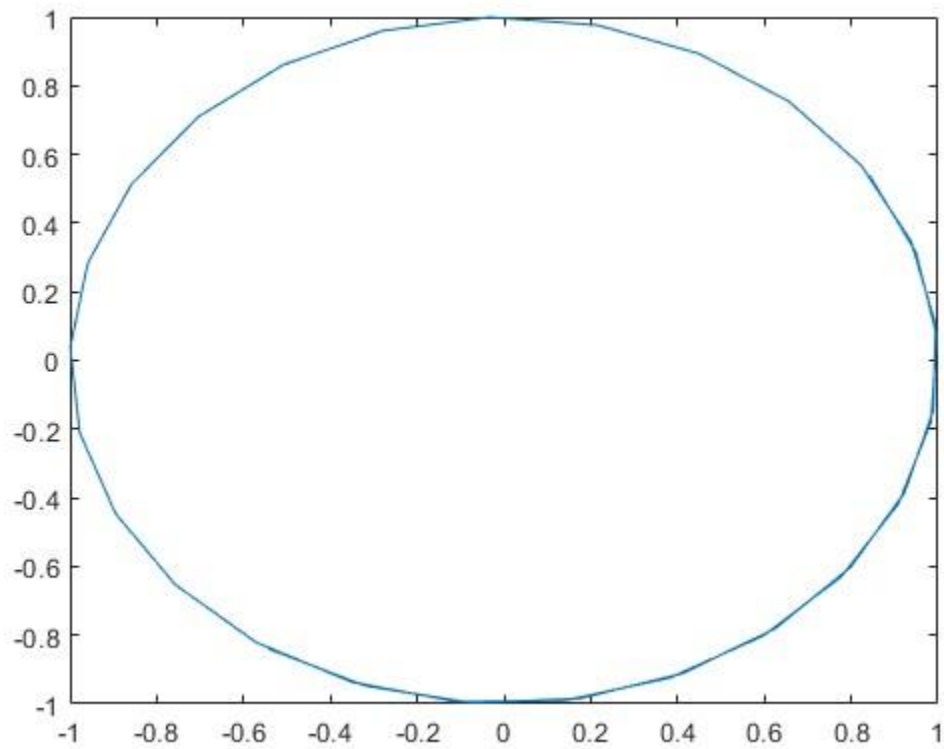
>> z(:,1)
ans =
    0.841470984807897
    0.948984619355586
    0.997494986604054

```

```
0.983985946873937
0.909297426825682
0.778073196887921
0.598472144103956
0.381660992052332
0.141120008059867
-0.108195134530108
-0.350783227689620
-0.571561318742344
-0.756802495307928
-0.894989358228583
-0.977530117665097
-0.999292788975378
-0.958924274663138
-0.858934493426592
-0.705540325570392
-0.508279077499258
-0.279415498198926
-0.033179216547557
0.215119988087816
0.450044073780618
0.656986598718789
0.823080879011506
0.937999976774739
0.994598779111176
0.989358246623382
0.922604210239340
0.798487112623490
0.624723953754192
0.412118485241757
0.173889485380434
-0.075151120461809
-0.319519193622274
-0.544021110889370
>> z(:,2)
ans =
0.540302305868140
0.315322362395269
0.070737201667703
```

-0.178246055649492
-0.416146836547142
-0.628173622722739
-0.801143615546934
-0.924302378632464
-0.989992496600445
-0.994129676080546
-0.936456687290796
-0.820559357339561
-0.653643620863612
-0.446087489913793
-0.210795799430780
0.037602152887977
0.283662185463226
0.512085477241841
0.708669774291260
0.861192417161521
0.960170286650366
0.999449418224499
0.976587625728023
0.893006344689077
0.753902254343305
0.567924173288695
0.346635317835026
0.103794357219253
-0.145500033808614
-0.385747937452222
-0.602011902684824
-0.780845683605749
-0.911130261884677
-0.984765173467324
-0.997172156196378
-0.947579803977993
-0.839071529076452

```
>> plot(z(:,1),z(:,2))
```



```
>> clf
```

```
>> f=sin(2*pi*time)./time
```

```
f =
```

```
Columns 1 through 7
```

```
-0.000000000000000 0.800000000000000 0.000000000000000 -0.571428571428571 -0.000000000000000 0.444444444444444 0.000000000000000
```

```
Columns 8 through 14
```

```
-0.363636363636364 -0.000000000000000 0.307692307692308 0.000000000000000 -0.266666666666667 -0.000000000000000 0.235294117647059
```

```
Columns 15 through 21
```

```
0.000000000000000 -0.210526315789474 -0.000000000000000 0.190476190476190 0.000000000000001 -0.173913043478261 -0.000000000000000
```

```
Columns 22 through 28
```

```
0.160000000000000 -0.000000000000000 -0.148148148148148 -0.000000000000000 0.137931034482759 0.000000000000001 -0.129032258064516
```

```
Columns 29 through 35
```

```
-0.000000000000000 0.121212121212121 -0.000000000000000 -0.114285714285714 -0.000000000000000 0.108108108108108 0.000000000000001
```

```
Columns 36 through 37
```

```
-0.102564102564103 -0.000000000000000
```

```
>> plot(time,f)
```

```
>> time = 0.1:0.1:10
```

```
time =
```

Columns 1 through 7

0.1000000000000000 0.2000000000000000 0.3000000000000000 0.4000000000000000 0.5000000000000000 0.6000000000000000 0.7000000000000000

Columns 8 through 14

0.8000000000000000 0.9000000000000000 1.0000000000000000 1.1000000000000000 1.2000000000000000 1.3000000000000000 1.4000000000000000

Columns 15 through 21

1.5000000000000000 1.6000000000000000 1.7000000000000000 1.8000000000000000 1.9000000000000000 2.0000000000000000 2.1000000000000000

Columns 22 through 28

2.2000000000000000 2.3000000000000000 2.4000000000000000 2.5000000000000000 2.6000000000000000 2.7000000000000000 2.8000000000000000

Columns 29 through 35

2.9000000000000000 3.0000000000000000 3.1000000000000000 3.2000000000000000 3.3000000000000000 3.4000000000000000 3.5000000000000000

Columns 36 through 42

3.6000000000000000 3.7000000000000000 3.8000000000000000 3.9000000000000000 4.0000000000000000 4.1000000000000000 4.2000000000000000

Columns 43 through 49

4.3000000000000000 4.3999999999999999 4.5000000000000000 4.6000000000000000 4.7000000000000000 4.8000000000000000 4.9000000000000000

Columns 50 through 56

5.0000000000000000 5.1000000000000000 5.1999999999999999 5.3000000000000000 5.3999999999999999 5.5000000000000000 5.6000000000000000

Columns 57 through 63

5.7000000000000000 5.8000000000000000 5.8999999999999999 6.0000000000000000 6.1000000000000000 6.1999999999999999 6.3000000000000000

Columns 64 through 70

6.4000000000000000 6.5000000000000000 6.6000000000000000 6.6999999999999999 6.8000000000000000 6.9000000000000000 7.0000000000000000

Columns 71 through 77

7.1000000000000000 7.1999999999999999 7.3000000000000000 7.4000000000000000 7.5000000000000000 7.6000000000000000 7.6999999999999999

Columns 78 through 84

7.8000000000000000 7.9000000000000000 8.0000000000000000 8.1000000000000000 8.1999999999999999 8.3000000000000001 8.4000000000000000

Columns 85 through 91

8.5000000000000000 8.6000000000000000 8.6999999999999999 8.8000000000000001 8.9000000000000000 9.0000000000000000 9.1000000000000000

Columns 92 through 98

9.1999999999999999 9.3000000000000001 9.4000000000000000 9.5000000000000000 9.6000000000000000 9.6999999999999999 9.8000000000000001

Columns 99 through 100

9.9000000000000000 10.0000000000000000

>> f=sin(2*pi*time)./time

f =

Columns 1 through 7

5.877852522924731 4.755282581475767 3.170188387650511 1.469463130731183 0.0000000000000000 -0.979642087154122 -1.358652166135933

Columns 8 through 14

-1.188820645368942 -0.653094724769415 -0.0000000000000000 0.534350229356794 0.792547096912628 0.731581935611656 0.419846608780338

Columns 15 through 21

-0.0000000000000000 -0.367365782682795 -0.559445009585385 -0.528364731275085 -0.309360659101302 -0.0000000000000000 0.279897739186892

Columns 22 through 28

0.432298416497797 0.413502833171806 0.244910521788530 -0.000000000000001 -0.226071250881720 -0.352243154183390 -0.339663041533983

Columns 29 through 35

-0.202684569756024 0.000000000000001 0.189608145900798 0.297205161342235 0.288198944331865 0.172878015380139 -0.000000000000001

Columns 36 through 42

-0.163273681192353 -0.257042301701393 -0.250278030603988 -0.150714167254480 -0.000000000000000 0.143362256656700 0.226442027689322

Columns 43 through 49

0.221175934022129 0.133587557339199 0.000000000000000 -0.127779402672276 -0.202352450275565 -0.198136774228157 -0.119956173937239

Columns 50 through 56

-0.000000000000000 0.115252010253425 0.182895483902914 0.179444625716067 0.108849120794903 0.000000000000001 -0.104961652195084

Columns 57 through 63

-0.166852020402659 -0.163975261430199 -0.099624619032623 -0.000000000000000 0.096358238080733 0.153396212305670 0.150961351792882

Columns 64 through 70

0.091841445670699 -0.000000000000000 -0.089058371559465 -0.141948733775396 -0.139861252396346 -0.085186268448184 -0.000000000000000

Columns 71 through 77

0.082786655252460 0.132091182818771 0.130281714560980 0.079430439498983 0.000000000000001 -0.077340164775325 -0.123513833285085

Columns 78 through 84

-0.121930322601943 -0.074403196492718 -0.000000000000000 0.072566080529934 0.115982501987214 0.114585122445199 0.069974434796723

Columns 85 through 91

-0.000000000000000 -0.068347122359590 -0.109316840953466 -0.108074604124449 -0.066043286774435 -0.000000000000000 0.064591785966205

Columns 92 through 98

0.103375708292951 0.102264141537113 0.062530345988561 0.000000000000001 -0.061227630447132 -0.098047063535583 -0.097046583295424

Columns 99 through 100

-0.059372247706310 -0.000000000000000

>> f(1:10)

ans =

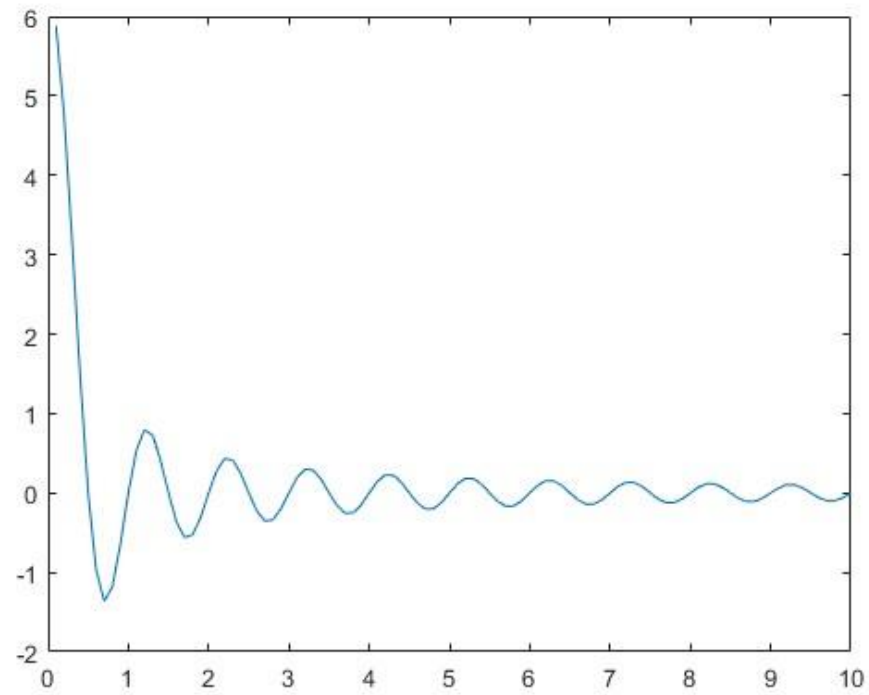
Columns 1 through 7

5.877852522924731 4.755282581475767 3.170188387650511 1.469463130731183 0.000000000000000 -0.979642087154122 -1.358652166135933

Columns 8 through 10

-1.188820645368942 -0.653094724769415 -0.000000000000000

```
>> plot(time,f)
```



```
>> A=[1 2; 3 4]
```

```
A =
```

```
1 2
```

```
3 4
```

```
>> v = [1; 1]
```

```
v =
```

```
1
```

```
1
```

```
>> w = A*v
```

```
w =
```

```
3
```

```
7
```

```
>> B=[v w]
```

```
B =
```

```
1 3
```

```
1 7
```

```
>> C=A*B
```

```
C =
```

```
3 17
```

```

7 37
>> D=B*A

D =

10 14
22 30

>> B = [v w v+w]

B =

1 3 4
1 7 8

>> C = A*B

C =

3 17 20
7 37 44

>> D = B'*A

D =

4 6
24 34
28 40

>> x=A\w

x =

1.000000000000000
1.000000000000000

>> [V,D]=eig(A)

V =

-0.824564840132394 -0.415973557919284
0.565767464968992 -0.909376709132124

D =

-0.372281323269014 0
0 5.372281323269014

>> E=A*V

E =

0.306970089805591 -2.234726976183532
-0.210624660521212 -4.885427510286349

>> D(1,1)*V(:,1)

ans =

0.306970089805591
-0.210624660521212

>> D(2,2)*V(:,2)

ans =

```

```
-2.234726976183532
```

```
-4.885427510286349
```

```
>> M = rand(4,5)
```

```
M =
```

```
0.814723686393179 0.632359246225410 0.957506835434298 0.957166948242946 0.421761282626275
```

```
0.905791937075619 0.097540404999410 0.964888535199277 0.485375648722841 0.915735525189067
```

```
0.126986816293506 0.278498218867048 0.157613081677548 0.800280468888800 0.792207329559554
```

```
0.913375856139019 0.546881519204984 0.970592781760616 0.141886338627215 0.959492426392903
```

```
>> N=M(1:3,1:2)
```

```
N =
```

```
0.814723686393179 0.632359246225410
```

```
0.905791937075619 0.097540404999410
```

```
0.126986816293506 0.278498218867048
```

```
>> N=zeros(2,6)
```

```
N =
```

```
0 0 0 0 0 0
```

```
0 0 0 0 0 0
```

```
>> N=zeros(1,6)
```

```
N =
```

```
0 0 0 0 0 0
```

```
>> N = ones(2,3)
```

```
N =
```

```
1 1 1
```

```
1 1 1
```

```
>> N = eye(3)
```

```
N =
```

```
1 0 0
```

```
0 1 0
```

```
0 0 1
```

```
>> N = eye(3,5)
```

```
N =
```

```
1 0 0 0 0
```

```
0 1 0 0 0
```

```
0 0 1 0 0
```

```
>>
```

```
2.
```

```
>> A = [1 -1 5; -1 4 2; 3 -1 2]
```

```
A =
```

```
1 -1 5
```

-1 4 2

3 -1 2

>> U=Reduce(A)

***** "REDUCE" a Matrix by Row Reduction *****

The current matrix is:

A =

1 -1 5

-1 4 2

3 -1 2

OPTIONS

<1> Interchange two rows. <4> Turn on rational

<2> Multiply a row by a nonzero scalar. display.

<3> Replace: row i by (row i - mult*row j)

<5> Turn off rational

<-1> "Undo" previous row operation. display.

<0> Quit reduce!

ENTER your choice ---> 3

For this option you will be asked for a MULTIPLIER which will then be multiplied by every element in the row you specify next. The multiple of the row will then be SUBTRACTED from the last row you enter (i.e., the row that changes). The first row you entered remains unchanged.

Enter MULTIPLIER. -1

Enter number of the row that you want to multiply by the MULTIPLIER. 1

Enter number of row that changes. 2

Replacement by Linear Combination Complete: --1 * Row 1 + Row 2.

The current matrix is:

A =

1 -1 5

0 3 7

3 -1 2

OPTIONS

<1> Interchange two rows. <4> Turn on rational

<2> Multiply a row by a nonzero scalar. display.

<3> Replace: row i by (row i - mult*row j)

<5> Turn off rational

<-1> "Undo" previous row operation. display.

<0> Quit reduce!

ENTER your choice ---> 3

For this option you will be asked for a MULTIPLIER which will then be multiplied by every element in the row you specify next. The multiple of the row will then be SUBTRACTED from the last row you enter (i.e., the row that changes). The first row you entered remains unchanged.

Enter MULTIPLIER. 3

Enter number of the row that you want to multiply by the MULTIPLIER. 1

Enter number of row that changes. 3

Replacement by Linear Combination Complete: $-3 * \text{Row 1} + \text{Row 3}$.

The current matrix is:

A =

1 -1 5

0 3 7

0 2 -13

OPTIONS

<1> Interchange two rows.

<4> Turn on rational

<2> Multiply a row by a nonzero scalar.

display.

<3> Replace: row i by (row i - mult*row j)

<5> Turn off rational

<-1> "Undo" previous row operation.

display.

<0> Quit reduce!

ENTER your choice ---> 3

For this option you will be asked for a MULTIPLIER which will then be multiplied by every element in the row you specify next. The multiple of the row will then be SUBTRACTED from the last row you enter (i.e., the row that changes). The first row you entered remains unchanged.

Enter MULTIPLIER. $2/3$

Enter number of the row that you want to multiply by the MULTIPLIER. 2

Enter number of row that changes. 3

Replacement by Linear Combination Complete: $-0.66667 * \text{Row 2} + \text{Row 3}$.

The current matrix is:

A =

1.0000000000000000 -1.0000000000000000 5.0000000000000000

0 3.0000000000000000 7.0000000000000000

0 0 -17.666666666666664

OPTIONS

<1> Interchange two rows.

<4> Turn on rational

<2> Multiply a row by a nonzero scalar.

display.

<3> Replace: row i by (row i - mult*row j)

<5> Turn off rational

<-1> "Undo" previous row operation. display.

<0> Quit reduce!

ENTER your choice ---> 0

***** --> REDUCE is over. Your final matrix is:

A =

```
1.0000000000000000 -1.0000000000000000 5.0000000000000000
0 3.0000000000000000 7.0000000000000000
0 0 -17.666666666666664
```

U =

```
1.0000000000000000 -1.0000000000000000 5.0000000000000000
0 3.0000000000000000 7.0000000000000000
0 0 -17.666666666666664
```

>> U=rref(A)

U =

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

>>