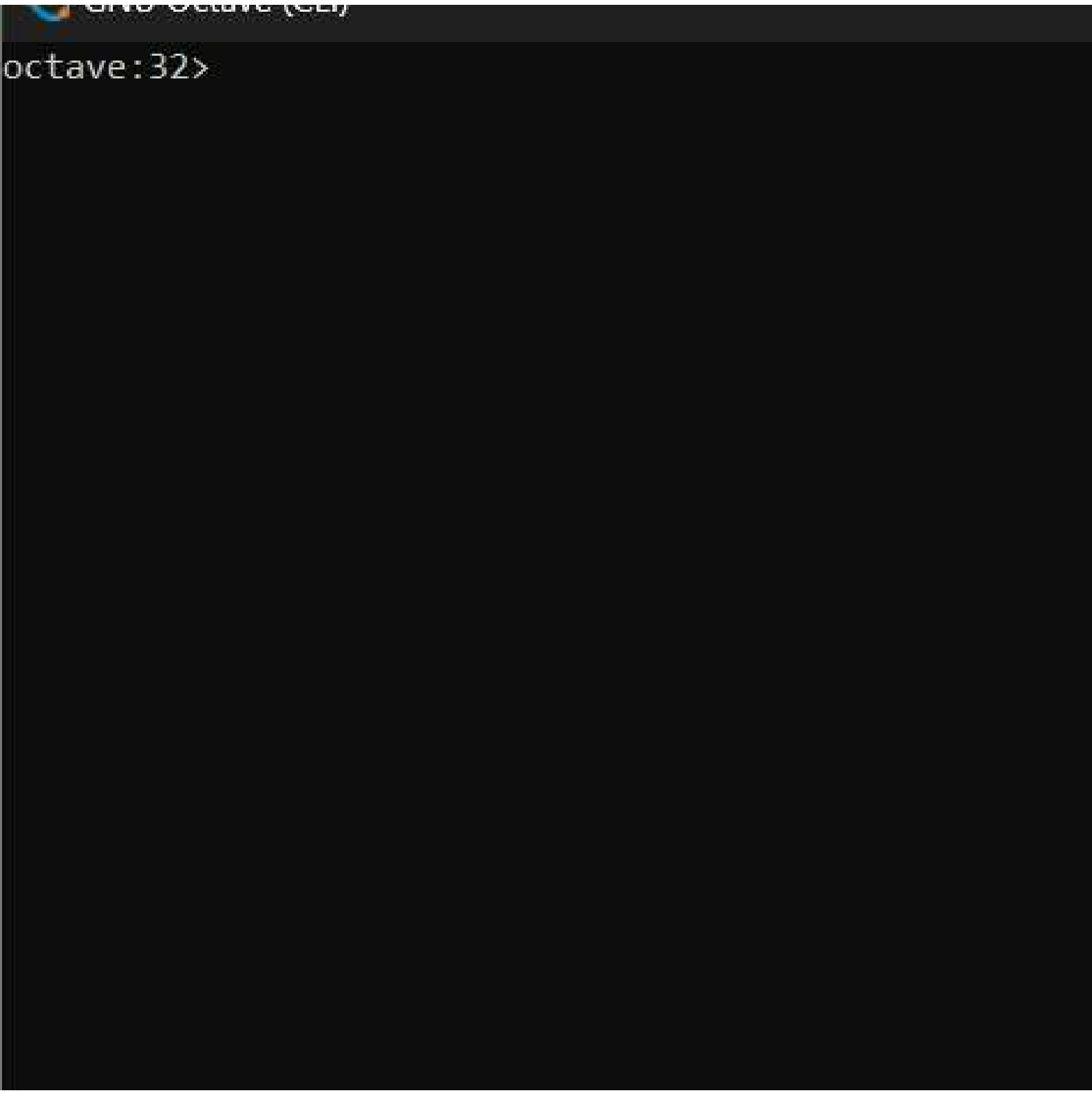
```
Home page:            https://octave.org
Support resources:    https://octave.org/support
Improve Octave:       https://octave.org/get-involved

For changes from previous versions, type 'news'.

octave:1> sqrt(98)
ans = 9.8995
octave:2> 98^0.5
ans = 9.8995
octave:3> 98^1/2
ans = 49
octave:4> 98^(1/2)
ans = 9.8995
octave:5>
octave:5>
octave:5>
octave:5>
octave:5> y = 25;
octave:6> sqrt_y = sqrt(y);
octave:7> isinteger(sqrt_y)
ans = 0
octave:8>
octave:8>
octave:8>
octave:8>
octave:8> help keywords
error: help: 'keywords' not found
octave:9>
octave:9> help keywords
error: help: 'keywords' not found
octave:10>
octave:10>
octave:10>
```

```
octave:10>
octave:10>
octave:10> a = 10;
octave:11> b = 5;
octave:12> c = 2;
octave:13> who
Variables visible from the current scope:

a       ans     b       c       sqrt_y  y

octave:14> whos
Variables visible from the current scope:

variables in scope: top scope

  Attr   Name        Size                     Bytes  Class
  ====   ====        ====                     =====  =====
         a           1x1                          8  double
         ans         1x1                          1  logical
         b           1x1                          8  double
         c           1x1                          8  double
         sqrt_y      1x1                          8  double
         y           1x1                          8  double

Total is 6 elements using 41 bytes

octave:15>
octave:15>
octave:15>
```

```
octave:15>
octave:15> x = 10;           % single value
octave:16> A = [1, 2, 3; 4, 5, 6];  % matrix
octave:17>
octave:17> whos
Variables visible from the current scope:

variables in scope: top scope

  Attr   Name        Size                     Bytes  Class
  ====   ====        ====                     =====  =====
         A           2x3                         48  double
         a           1x1                          8  double
         ans         1x1                          1  logical
         b           1x1                          8  double
         c           1x1                          8  double
         sqrt_y      1x1                          8  double
         x           1x1                          8  double
         y           1x1                          8  double

Total is 13 elements using 97 bytes

octave:18>
octave:18>
octave:18>
octave:18>
octave:18> inf / 5           % Divide by a positive real number
ans = Inf
octave:19> inf / 0           % Divide by zero
ans = Inf
octave:20> inf / -3          % Divide by a negative real number
ans = -Inf
octave:21> inf / (3 + 4i)    % Divide by an imaginary number
ans =  Inf - Infi
octave:22>
octave:22>
octave:22>
octave:22> inf / inf
ans = NaN
octave:23>
```

```
octave:22>
octave:22>
octave:22> inf / inf
ans = NaN
octave:23>
octave:23>
octave:23>
octave:23> inf^2
ans = Inf
octave:24>
octave:24>
octave:24>
octave:24> sqrt(inf)
ans = Inf
octave:25>
octave:25>
octave:25>
octave:25> inf + inf
ans = Inf
octave:26>
octave:26>
octave:26>
octave:26> inf * inf
ans = Inf
octave:27>
octave:27>
octave:27>
octave:27> inf - inf
ans = NaN
octave:28>
octave:28>
octave:28>
octave:28> sqrt(-inf)
ans =    0 + Infi
octave:29>
octave:29>
octave:29>
octave:29> inf^inf
ans = Inf
octave:30>
octave:30>
octave:30>
```

```
octave:30>
octave:30>
octave:30> inf / 1i
ans =  NaN - Infi
octave:31>
octave:31>
octave:31>
```


octave:32>


octave:32> clear
octave:33>

```
octave:32> clear
octave:33> format short
octave:34>
octave:34>
octave:34> pi + e
ans = 5.8599
octave:35>
octave:35>
octave:35>
octave:35> format long
octave:36>
octave:36>
octave:36> pi + e
ans = 5.859874482048838
octave:37>
octave:37>
octave:37>
octave:37>
```

```
octave:37>
octave:37>
octave:37> X = [2, 3; 4, 1]
X =

   2   3
   4   1

octave:38> A = [3, 4, 10; 70, 1, 30]
A =

    3    4   10
   70    1   30

octave:39> Z = [2, 3; 50, 49; 0, 1]
Z =

    2    3
   50   49
    0    1

octave:40> Y = [1, 0, 0; 0, 1, 0; 0, 0, 1]
Y =

   1   0   0
   0   1   0
   0   0   1

octave:41>
```

```
octave:41> X_transpose = X'
X_transpose =

   2   4
   3   1

octave:42> A_transpose = A'
A_transpose =

    3   70
    4    1
   10   30

octave:43> Z_transpose = Z'
Z_transpose =

    2   50    0
    3   49    1

octave:44> Y_transpose = Y'
Y_transpose =

   1   0   0
   0   1   0
   0   0   1

octave:45>
```

```
octave:45> X_flip_lr = fliplr(X)
X_flip_lr =

   3   2
   1   4

octave:46> A_flip_lr = fliplr(A)
A_flip_lr =

   10    4    3
   30    1   70

octave:47> Z_flip_lr = fliplr(Z)
Z_flip_lr =

    3    2
   49   50
    1    0

octave:48> Y_flip_lr = fliplr(Y)
Y_flip_lr =

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

```
octave:49> X_flip_ud = flipud(X)
X_flip_ud =

   4   1
   2   3

octave:50> A_flip_ud = flipud(A)
A_flip_ud =

   70    1   30
    3    4   10

octave:51> Z_flip_ud = flipud(Z)
Z_flip_ud =

    0    1
   50   49
    2    3

octave:52> Y_flip_ud = flipud(Y)
Y_flip_ud =

   0   0   1
   0   1   0
   1   0   0

octave:53>
```

```
octave:53> x = 7;
octave:54> y = x^2 - 6*x + 5;
octave:55>
octave:55>
octave:55>
octave:55> matrix_1 = linspace(5, 150, 11);
octave:56>
octave:56>
octave:56> matrix_2 = logspace(log10(10), log10(1000), 7);
octave:57>
```

```
octave:57> rand(3,4)
ans =

   4.193520202893629e-01   8.120921582893335e-01   5.910957766250931e-01   8.870015718680668e-02
   7.948321812379504e-01   7.099540635428666e-01   1.779081979698414e-01   7.498738299185631e-01
   6.915089250709695e-01   7.258237670698170e-01   7.291304187442410e-01   4.630908305645768e-01

octave:58> rand(3,4)
ans =

   9.545846483530833e-01   9.659686520654309e-01   7.025352605881987e-01   6.962732632794572e-01
   2.289736330066373e-01   9.333224811981884e-01   6.511228403924542e-01   4.333561081937665e-02
   7.186072682302100e-01   8.663581033970050e-01   8.149217335114977e-01   3.927410940677569e-01

octave:59> rand(3,4)
ans =

   1.008248919867508e-01   7.016488000031755e-01   4.964158136999119e-02   2.160957631494467e-01
   7.811164981403214e-01   7.621739926328515e-01   2.454713041051826e-03   1.084277568486574e-01
   1.586371191182374e-01   6.280921966828057e-04   6.493997847352415e-01   7.667069806625884e-01

octave:60> rand(3,4)
ans =

   0.377226682964766   0.822010303457536   0.142352277534296   0.767910945134888
   0.787277839539928   0.833519879598982   0.676808155776934   0.429191163349235
   0.317379179482026   0.832973744692023   0.194504724279958   0.438921041753512

octave:61> rand(3,4)
ans =

   0.738691646508203   0.898735948738999   0.774214454248693   0.944446445854652
   0.694206876184528   0.394090890424839   0.124212957272823   0.522324939434540
   0.397004810634098   0.906918602868823   0.948633197907227   0.543673363823709

octave:62>
```

```
octave:62> matrix1 = rand(3,4)
matrix1 =

   7.841304281072535e-01   5.147820420514423e-01   2.635007711378633e-01   1.135926606009907e-02
   7.570264665517036e-01   2.577772848487802e-01   6.527023897103252e-01   4.794223375674990e-01
   9.769092416624600e-01   4.426499994167997e-01   6.752592535777467e-01   4.367066728523242e-01

octave:63> matrix2 = rand(3,4)
matrix2 =

   9.388212142208182e-01   7.657292633445544e-01   4.644813170037211e-01   2.501586106912048e-01
   4.977278946402984e-01   3.521172309001080e-01   5.941359433073012e-01   5.521613420570248e-01
   6.100000047938670e-02   6.074809447727206e-01   6.267104574504168e-02   9.168657087098104e-01

octave:64> matrix3 = rand(3,4)
matrix3 =

   0.403289035432964   0.646760560577073   0.161101946098323   0.903079165578166
   0.144375974086698   0.401643678171721   0.960498852245376   0.315537744411420
   0.719130919601334   0.125593595010841   0.587331705051829   0.919058484089883

octave:65>
```

```
octave:65> x = 0;
octave:66> x = x + 25;
octave:67> x = x + 25;
octave:68> x = x + 25;
octave:69> x = x + 25;
octave:70> x = x + 25;
octave:71> x = x + 25;
octave:72> x = x + 25;
octave:73>
octave:73>
octave:73>
```

```
octave:74>
octave:74> a = 2;
octave:75> z = 8;
octave:76> for i = 1:14
>     a = a + 1;
>     z = z * 2;
> end
octave:77> a
a = 16
octave:78> z
z = 131072
octave:79>
octave:79> % Now change the values of a and z
octave:79> a = 5;
octave:80> z = 3;
octave:81> for i = 1:14
>     a = a + 1;
>     z = z * 2;
> end
octave:82> a
a = 19
octave:83> z
z = 49152
octave:84>
```

```
octave:84>
octave:84>
octave:84> matrix = [2, 3; 4, 5];
octave:85> inv_matrix = inv(matrix);
octave:86>
octave:86>
octave:86> y = eye(12);
octave:87> y
y =

Diagonal Matrix

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

octave:88>
```

```
octave:88>
octave:88> y = eye(12);
octave:89> y
y =

Diagonal Matrix

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

octave:90> det_y = det(y);
octave:91> y
y =

Diagonal Matrix

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

octave:92>
```

```
octave:93> az
az =

    2    9   16   23   30   37   44   51   58   65   72   79   86   93

octave:94> k = [2, 3, 7; 8, 3, 4];
octave:95> m = imrotate(k, 540);
error: 'imrotate' undefined near line 1, column 5

The 'imrotate' function belongs to the image package from Octave Forge
which you have installed, but not loaded.  To load the package, type
‘pkg load image’ from the Octave prompt.
octave:96>
octave:96>
octave:96> w = [1, 0, 1; 2, 3, 5];
octave:97> v = reshape(w, [], 1);
octave:98> w
w =

   1   0   1
   2   3   5

octave:99> v
v =

   1
   2
   0
   3
   1
   5

octave:100>
```

```
octave:100> H=[2,3;4,5]
H =

   2   3
   4   5

octave:101> K=[1,0;5,6]
K =

   1   0
   5   6

octave:102> V=H*K
V =

   17   18
   29   30

octave:103> V-[1,1;2,2]
ans =

   16   17
   27   28

octave:104>
```