diary Project0

diary on

format compact

diary off

diary Project0

diary on

A=[-2 -1 8 3; -1 -2 3 1; -3 -7 5 4]

A =

-2 -1 8 3

-1 -2 3 1

-3 -7 5 4

B=[1 -2; 3 -1; 1 -1]

B =

1 -2

3 -1

1 -1

X=[-2; 3; 5]

X =

-2

3

5

x=[1 2 3 4]

x =

1 2 3 4

y=[1; 4; 6; 3]

y =

1

4

6

3

size(A)

ans =

3 4

size(B)

ans =

3 2

size(X)

ans =

3 1

size(x)

ans =

1 4

size(y)

ans =

4 1

%The matrices x and y are not the same size because their rows and columns are not equal

F=[5 2 -3; 4 3 -2; 1 -1 6; 1 -1 -2];

A(1,3)

ans =

8

%This command retrieves the entry in the first row and third column of matrix A

A(:,3)

ans =

8

3

5

%This command retrieves the third column of matrix A

A(2,:)

ans =

-1 -2 3 1

%This command retrieves the second row of matrix A

A([1 2], [3 4])

ans =

8 3

3 1

%This command obtains the sub matrix of A between rows 1&2 and columns 3&4

F(:,4)=[-1 1 -4 3]

F =

5 2 -3 -1

4 3 -2 1

1 -1 6 -4

1 -1 -2 3

%This command creates a fourth column in F and sets it to [-1 1 -4 3]

F([1 3], [2 4]) =[1 -3; 2 -4]

F =

5 1 -3 -3

4 3 -2 1

1 2 6 -4

1 -1 -2 3

%This command changes the values in row 1 and cloumn 2&4 to 1 and -3 respectively. The same is done in row three, but the values are 2 and -4

F([2 3], :) = A([1 3], :)

F =

5 1 -3 -3

-2 -1 8 3

-3 -7 5 4

1 -1 -2 3

%This command sets row 2&3 in matrix F to rows 1&3 of matrix A respectively

F(:, [1 2]) = F(:, [2 1])

F =

1 5 -3 -3

-1 -2 8 3

-7 -3 5 4

-1 1 -2 3

%This command swaps columns 1&2 of matrix F

F(:, 1) = y

F =

1 5 -3 -3

4 -2 8 3

6 -3 5 4

3 1 -2 3

F([1 2], :) = F([2 1], :)

F =

4 -2 8 3

1 5 -3 -3

6 -3 5 4

3 1 -2 3

[A B]

ans =

-2 -1 8 3 1 -2

-1 -2 3 1 3 -1

-3 -7 5 4 1 -1

%Augmented matrix of B onto A

[B A]

ans =

1 -2 -2 -1 8 3

3 -1 -1 -2 3 1

1 -1 -3 -7 5 4

%Augmented matrix of A onto B

[A x]

{\_Error using <a href="matlab:matlab.internal.language.introspective.errorDocCallback('horzcat')" style="font-weight:bold">horzcat</a>

Dimensions of matrices being concatenated are not

consistent.}\_

[A X]

ans =

-2 -1 8 3 -2

-1 -2 3 1 3

-3 -7 5 4 5

%Augmented matrix of X onto A

[A; y]

{\_Error using <a href="matlab:matlab.internal.language.introspective.errorDocCallback('vertcat')" style="font-weight:bold">vertcat</a>

Dimensions of matrices being concatenated are not

consistent.}\_

[A; x]

ans =

-2 -1 8 3

-1 -2 3 1

-3 -7 5 4

1 2 3 4

%Creates a new matrix with A on top of x

eye(5)

ans =

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

%Makes 5x5 matrix with a diagonal of ones. The rest of the entries are zeroes

zeros(3,4)

ans =

0 0 0 0

0 0 0 0

0 0 0 0

%creates a 3x4 matrix of zeroes

zeros(2)

ans =

0 0

0 0

%creates a 2x2 matrix of zeros

ones(3,2)

ans =

1 1

1 1

1 1

%creates a 3x2 matrix of ones

ones(5)

ans =

1 1 1 1 1

1 1 1 1 1

1 1 1 1 1

1 1 1 1 1

1 1 1 1 1

%creates a 5x5 matrix of ones

diag([1 2 5 6 7])

ans =

1 0 0 0 0

0 2 0 0 0

0 0 5 0 0

0 0 0 6 0

0 0 0 0 7

%creates a matrix the size of the number of entries and then makes those entries a diagonal

diag([1 2 5 6 7], -1)

ans =

0 0 0 0 0 0

1 0 0 0 0 0

0 2 0 0 0 0

0 0 5 0 0 0

0 0 0 6 0 0

0 0 0 0 7 0

%creates the same matrix above but moves the diagonal down a row and add a column of zeros

diag([1 2 5 6 7],2)

ans =

0 0 1 0 0 0 0

0 0 0 2 0 0 0

0 0 0 0 5 0 0

0 0 0 0 0 6 0

0 0 0 0 0 0 7

0 0 0 0 0 0 0

0 0 0 0 0 0 0

% this does the same thing as the command before except it moves the diagonal up two rows

A,diag(A),diag(diag(A))

A =

-2 -1 8 3

-1 -2 3 1

-3 -7 5 4

ans =

-2

-2

5

ans =

-2 0 0

0 -2 0

0 0 5

%first command prints A, the second command gets the diagonal starting at the first entry, and the third command creates a new matrix of zeros and a diagonal of the diagonal of A

magic(5)

ans =

17 24 1 8 15

23 5 7 14 16

4 6 13 20 22

10 12 19 21 3

11 18 25 2 9

help magic

<strong>magic</strong> Magic square.

<strong>magic</strong>(N) is an N-by-N matrix constructed from the integers

1 through N^2 with equal row, column, and diagonal sums.

Produces valid magic squares for all N > 0 except N = 2.

<a href="matlab:doc magic">Reference page for magic</a>

%this creates a magic square where each row, column, and diagonal add up to the same sum

hilb(5)

ans =

1.0000 0.5000 0.3333 0.2500 0.2000

0.5000 0.3333 0.2500 0.2000 0.1667

0.3333 0.2500 0.2000 0.1667 0.1429

0.2500 0.2000 0.1667 0.1429 0.1250

0.2000 0.1667 0.1429 0.1250 0.1111

help hilb

<strong>hilb</strong> Hilbert matrix.

<strong>hilb</strong>(N) is the N by N matrix with elements 1/(i+j-1),

which is a famous example of a badly conditioned matrix.

See INVHILB for the exact inverse.

<strong>hilb</strong>(N,CLASSNAME) produces a matrix of class CLASSNAME.

CLASSNAME must be either 'single' or 'double' (the default).

This is also a good example of efficient MATLAB programming

style where conventional FOR or DO loops are replaced by

vectorized statements.

See also <a href="matlab:help invhilb">invhilb</a>.

<a href="matlab:doc hilb">Reference page for hilb</a>

%this command creates a hilbert matrix of order N, where each entry has the value 1/(m+n-1)

C= eye(3)

C =

1 0 0

0 1 0

0 0 1

D= diag([2 1 3],1)

D =

0 2 0 0

0 0 1 0

0 0 0 3

0 0 0 0

E= ones(2,3)

E =

1 1 1

1 1 1

V1=1:7

V1 =

1 2 3 4 5 6 7

V2=2:0.5:6.5

V2 =

Columns 1 through 5

2.0000 2.5000 3.0000 3.5000 4.0000

Columns 6 through 10

4.5000 5.0000 5.5000 6.0000 6.5000

V3=3:-1:-5

V3 =

Columns 1 through 8

3 2 1 0 -1 -2 -3 -4

Column 9

-5

%the first command creates a matrix of 7 entries starting at one and then adding one until 7

%the second creates a matrix starting at 2 with a step of 0.5 to 6.5

%the trid creates a matrix starting at 3 with a step of -1 to -5

V4=-5:1:1

V4 =

-5 -4 -3 -2 -1 0 1

V5=10:-3:-2

V5 =

10 7 4 1 -2

V6=5:-0.5:2

V6 =

Columns 1 through 5

5.0000 4.5000 4.0000 3.5000 3.0000

Columns 6 through 7

2.5000 2.0000

V7=0:0.4:4

V7 =

Columns 1 through 5

0 0.4000 0.8000 1.2000 1.6000

Columns 6 through 10

2.0000 2.4000 2.8000 3.2000 3.6000

Column 11

4.0000

C;

C

C =

1 0 0

0 1 0

0 0 1

%both commands do the same thing but the second outputs the matrix

R=434.1452

R =

434.1452

%sets R equal to 434.1452

format long, R

R =

4.341452000000000e+02

%Formats a number to have a large amount of floating points

format short, R

R =

434.1452

%Formats a number to have a small amount of floating points

A,A+A

A =

-2 -1 8 3

-1 -2 3 1

-3 -7 5 4

ans =

-4 -2 16 6

-2 -4 6 2

-6 -14 10 8

A,2\*A

A =

-2 -1 8 3

-1 -2 3 1

-3 -7 5 4

ans =

-4 -2 16 6

-2 -4 6 2

-6 -14 10 8

A, B, A+B

A =

-2 -1 8 3

-1 -2 3 1

-3 -7 5 4

B =

1 -2

3 -1

1 -1

{\_Matrix dimensions must agree.}\_

%the two matricies do not have the same size

B,E,B-2\*E

B =

1 -2

3 -1

1 -1

E =

1 1 1

1 1 1

{\_Matrix dimensions must agree.}\_

%again the two matricies do not have the same size

x,X,x+X

x =

1 2 3 4

X =

-2

3

5

ans =

-1 0 1 2

4 5 6 7

6 7 8 9

x,y,x+y

x =

1 2 3 4

y =

1

4

6

3

ans =

2 3 4 5

5 6 7 8

7 8 9 10

4 5 6 7

transpose(A)

ans =

-2 -1 -3

-1 -2 -7

8 3 5

3 1 4

A\*D

ans =

0 -4 -1 24

0 -2 -2 9

0 -6 -7 15

A.\*A

ans =

4 1 64 9

1 4 9 1

9 49 25 16

A.\*D

{\_Matrix dimensions must agree.}\_

%A is a 3x4 matrix and B is a 4x4 matrix so they have different sizes

A\*A

{\_Error using <a href="matlab:matlab.internal.language.introspective.errorDocCallback('mtimes')" style="font-weight:bold"> \* </a>

Inner matrix dimensions must agree.}\_

%A has four columns, but 3 rows so they don't correlate

G=[4 2 1; 3 1 6; 7 7 8]

G =

4 2 1

3 1 6

7 7 8

G^2

ans =

29 17 24

57 49 57

105 77 113

A^2

{\_Error using <a href="matlab:matlab.internal.language.introspective.errorDocCallback('mpower')" style="font-weight:bold"> ^ </a>

One argument must be a square matrix and the other must be a

scalar. Use POWER (.^) for elementwise power.}\_

%G^2 is equivilent to G\*G

%A is not a square matrix

%A.\*A would give you the right output

rand(4)

ans =

0.8147 0.6324 0.9575 0.9572

0.9058 0.0975 0.9649 0.4854

0.1270 0.2785 0.1576 0.8003

0.9134 0.5469 0.9706 0.1419

rand(3,4)

ans =

0.2769 0.8235 0.9502 0.3816

0.0462 0.6948 0.0344 0.7655

0.0971 0.3171 0.4387 0.7952

randi(100,2)

ans =

19 45

49 65

randi(10,2,4)

ans =

8 3 7 2

8 7 2 5

randi([10 40],2,4)

ans =

39 28 33 25

20 16 17 31

%first command creates a 4x4 matrix with a interval of [0, 1]

%second command creates a 3x4 matrix with a interval of [0, 1]

%third command creates a 2x2 matrix with integers in the interval [0, 100]

%fourth command creates a 2x4 matrix with integers in the interval [0, 10]

%fifth command creates a 2x4 matrix with integers in the interval [10, 40]

5\*rand(3)

ans =

4.4545 0.6931 4.2036

4.7965 0.7465 1.2714

2.7361 1.2875 4.0714

-3+5\*rand(3)

ans =

-1.7824 -2.0170 -0.6336

1.6463 -1.7446 -1.2417

-1.2501 0.0802 1.1541

4+6\*rand(2,3)

ans =

7.5116 9.5032 8.5432

7.2983 5.7150 8.5224

randi([40 90], 2, 3)

ans =

59 43 67

68 42 79

diary Project0

diary on

type adds

function C=adds(A,B)

% This is the function which adds

% matrices A and B. It duplicates the MATLAB

% function A+B.

[m,n]=size(A);

[k,p]=size(B);

if m==k && n==p,

for i=1:m

for j=1:n

C(i,j)=A(i,j)+B(i,j);

end

end

else

disp('Error in using adds: matrices are not of the same size')

C=[];

end

end

A=[1 2 3 4;4 5 6 7;7 8 9 10]

A =

1 2 3 4

4 5 6 7

7 8 9 10

B=ones(2,3)

B =

1 1 1

1 1 1

C=adds(A,B)

Error in using adds: matrices are not of the same size

C =

[]

A=magic(4), B=ones(4)

A =

16 2 3 13

5 11 10 8

9 7 6 12

4 14 15 1

B =

1 1 1 1

1 1 1 1

1 1 1 1

1 1 1 1

C=adds(A,B)

C =

17 3 4 14

6 12 11 9

10 8 7 13

5 15 16 2

diary Project0

diary on

type genhilb

function A = genhilb(m,n)

%This method creates a general hilbert

% matrix iff m and n are integers

if m==floor(m) && n==floor(n),

if m==n,

A=hilb(m);

B=invhilb(m)

else

for i=1:m

for j=1:n

A(i,j) = 1/(i + j - 1);

end

end

end

else

disp('Error: both m and n must be integers')

A=[];

end

format rat

end

A=genhilb(3.5,4)

Error: both m and n must be integers

A =

[]

A=genhilb(5,1.6)

Error: both m and n must be integers

A =

[]

A=genhilb(3,4)

A =

Columns 1 through 3

1 1/2 1/3

1/2 1/3 1/4

1/3 1/4 1/5

Column 4

1/4

1/5

1/6

A=genhilb(4,4)

B =

Columns 1 through 3

16 -120 240

-120 1200 -2700

240 -2700 6480

-140 1680 -4200

Column 4

-140

1680

-4200

2800

A =

Columns 1 through 3

1 1/2 1/3

1/2 1/3 1/4

1/3 1/4 1/5

1/4 1/5 1/6

Column 4

1/4

1/5

1/6

1/7

A=genhilb(3,3)

B =

9 -36 30

-36 192 -180

30 -180 180

A =

1 1/2 1/3

1/2 1/3 1/4

1/3 1/4 1/5

diary off