Assignment-2

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```
% Question 1
%%
clc
d = [1 2 3 4];
D = diag(d);
disp (D);

%%
clc
A = [1:4;5:8;9:12];
x = diag(A);
disp (A);
disp (x);
```

OUTPUT

```
   1     2     3     4
   5     6     7     8
   9    10    11    12

   1
   6
  11
```

```
% Question 2

clear all;
%%
clc;
L1 = linspace(1, 20);
disp(L1);

%%
clc;
L1 = linspace(1, 20, 5);
disp(L1);

%%
clc;
L1 = logspace(2, 4);
disp(L1);

%%
clc;
L1 = logspace(1, 4, 8);
disp(L1);

%%
clc;
L1 = 2:10;
disp(L1);

%%
clc;
L1 = 2:1.5:20;
disp(L1);
```

OUTPUT-1

```
  Columns 1 through 9

       1            118/99         137/99          52/33         175/99
194/99          71/33         232/99         251/99

  Columns 10 through 18

      30/11         289/99          28/9          109/33         346/99
365/99         128/33         403/99         422/99

  Columns 19 through 27

      49/11         460/99         479/99         166/33          47/9
536/99         185/33         574/99         593/99

  Columns 28 through 36

      68/11         631/99         650/99         223/33         688/99
707/99          22/3          745/99         764/99
```

```
  Columns 37 through 45

     87/11         802/99         821/99         280/33         859/99
878/99         299/33         916/99          85/9

  Columns 46 through 54

    106/11         973/99         992/99         337/33        1030/99
1049/99         356/33        1087/99        1106/99

  Columns 55 through 63

    125/11         104/9         1163/99         394/33        1201/99
1220/99         413/33        1258/99        1277/99

  Columns 64 through 72

    144/11        1315/99        1334/99          41/3         1372/99
1391/99         470/33        1429/99        1448/99

  Columns 73 through 81

    163/11        1486/99        1505/99         508/33        1543/99
142/9          527/33        1600/99        1619/99

  Columns 82 through 90

    182/11        1657/99        1676/99         565/33        1714/99
1733/99         584/33         161/9         1790/99

  Columns 91 through 99

    201/11        1828/99        1847/99         622/33        1885/99
1904/99         641/33        1942/99        1961/99

  Column 100

     20
```

OUTPUT-2

```
1             23/4           21/2           61/4           20
```

OUTPUT-3

```
  Columns 1 through 9

    100           5273/48        6396/53       65225/492       9175/63
11359/71       41653/237       8302/43        4454/21

  Columns 10 through 18
```

```
   48463/208       5631/22       41333/147       8031/26       30539/90
20129/54       24160/59       22942/51       17296/35

  Columns 19 through 27

   45058/83       41149/69       25550/39       25189/35       37949/48
37346/43       20036/21       55550/53       49510/43

  Columns 28 through 36

   96129/76      154234/111      18317/12       10061/6        25789/14
34401/17      631331/284      46399/19       61702/23

  Columns 37 through 45

   55994/19       35612/11       88912/25       66418/17       64379/15
70723/15       98410/19       85348/15       56255/9

  Columns 46 through 50

  295259/43       60345/8        58005/7       500664/55       10000
```

OUTPUT-4

```
10          14728/549      11443/159       8302/43        9841/19
154234/111     119283/32       10000
```

OUTPUT-5

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

OUTPUT-6

```
  Columns 1 through 9

       2              7/2            5             13/2            8
19/2           11             25/2           14

  Columns 10 through 13

      31/2           17             37/2           20
```

```
% Question 3

clear all;
%%
clc
A1 = ones(6,4); %populate with ones A1 = 6x4
disp (A1);
A2 = ones(5); %populate with ones A2 = 5x5
disp (A2);

%%
clc
B = zeros(4,4); %populate with zeros B = 4x4
disp (B);

%%
clc
C = eye(5); %eye-dentity matrix C=5x5
disp (C);

%%
clc
D = rand(8); %random 2x2 Matrix
disp (D);
disp(D(:,3));
disp(D(2,:));
disp(D(2,3));
D(3:6,3:6)=zeros(4,4);
disp(D);
```

Output - 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     1     1     1

     1     1     1     1     1

     1     1     1     1     1
```

Output-2

```
     0     0     0     0
```

0 0 0 0

0 0 0 0

0 0 0 0

Output-4

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

Output-4

64/815 338/353 407/965 1481/2182 18/65 573/1306 659/929 1049/1093

1298/1433 687/712 1065/1163 979/1292 243/5263 1469/3850 1409/1867 547/1607

751/5914 589/3737 0 0 0 0 175/634 580/991

717/785 6271/6461 0 0 0 0 365/537 438/1957

1493/2361 581/607 0 0 0 0 302/461 1927/2565

694/7115 614/1265 0 0 0 0 655/4028 388/1521

408/1465 1142/1427 439/517 1016/1439 1069/1125 954/2141 1078/9059 637/1259

1324/2421 689/4856 283/303 128/4021 259/7519 561/868 457/917 1287/1841

```
% Question 4


clc;
clear all;
A = rand(8);
disp(A);
rm = [];
cm = [];
for i=1:8
    rm(i) = max(A(i,:));
end
disp (rm(:)); %row max
for i=1:8
    cm(i) = max(A(:,i));
end
disp(cm); %column max

if max(cm)>max(rm)
    M = max(cm);
else
    M = max(rm);
end
disp (M);
```

Output:

0.6791 0.0987 0.4942 0.0305 0.8055 0.9787 0.5216 0.9730

0.3955 0.2619 0.7791 0.7441 0.5767 0.7127 0.0967 0.6490

0.3674 0.3354 0.7150 0.5000 0.1829 0.5005 0.8181 0.8003

0.9880 0.6797 0.9037 0.4799 0.2399 0.4711 0.8175 0.4538

0.0377 0.1366 0.8909 0.9047 0.8865 0.0596 0.7224 0.4324

0.8852 0.7212 0.3342 0.6099 0.0287 0.6820 0.1499 0.8253

0.9133 0.1068 0.6987 0.6177 0.4899 0.0424 0.6596 0.0835

0.7962 0.6538 0.1978 0.8594 0.1679 0.0714 0.5186 0.1332

0.9787

0.7791

0.8181

0.9880

0.9047

0.8852

0.9133

0.8594

0.9880 0.7212 0.9037 0.9047 0.8865 0.9787 0.8181 0.9730

0.9880

```
% Question 5

n = input('Enter value of n:');
M = magic(n);
rsum = M(1,:);
csum = M(:,1);
diagsum = 0;
adiagsum = 0;
flag = 0;
for i=1:n-1
    rsum = sum(M(i,:));
    rsum1 = sum(M(i+1,:));
    if rsum == rsum1
       flag = 0;
    else
       flag = flag + 1;
    end
end
for i=1:n-1
    csum = sum(M(:,i));
    csum1 = sum(M(:,i+1));
    if csum == csum1
       flag = 0;
    else
       flag = flag + 1;
    end
end
for i=1:n
    for j=1:n
        if i == j
            diagsum = diagsum + M(i,j);
        end
    end
end
for i=1:n
    for j=1:n
        if i+j == n+1
            adiagsum = adiagsum + M(i,j);
        end
    end
end
if diagsum == adiagsum
   flag = 0;
else
   flag = flag + 1;
end

disp(M);
disp(rsum);
disp(csum);
disp(diagsum);
disp(adiagsum);
if flag ~= 0
    disp('It is not a Magic Matrix');
else
    disp('Magic Matrix Verified!');
```

```
end
```

>> Question5

```
Enter value of n:5

    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

    65

    65

    65

    65

Magic Matrix Verified!
```

```
% Question 6

A=rand(3);
I=eye(3);
B=A^(-1);
C=I/A;

if B==C
    disp('true');
else
    disp('false');
end

B=A.^(-1);
C=I./A;

if B==C
    disp('True');
else
    disp('False');
end
```

Output:

```
>> Question6

true

False
```

```
% Question 7

p = [1 2 3 4 5];
disp((length(p):-1:1).*p);
%(length(p)-1:-1:0) will produce a matrix of (5-1 i.e 4) to 0 with -1 step
% [4 3 2 1 0].*[1 2 3 4 5] = [4 6 6 4 0] i.e element wise multiplication.
```

>> Question7

```
   5   8   9   8   5
```

```
% Question 8

n = input('Enter value of n: ');
A = eye(n);
for i=1:n
    for j=1:n
        if i==j || j==n
           A(i,j) = 1;
        elseif i>j
            A(i,j) = -1;
        else
            A(i,j) = 0;
        end
    end
end
disp(A)
```

Output:

```
>> Question8

Enter value of n: 5

   1   0   0   0   1

  -1   1   0   0   1

  -1  -1   1   0   1

  -1  -1  -1   1   1

  -1  -1  -1  -1   1
```

```
% Question 9

clc
clear all

%%
n = input('Enter n: ');
v1 = zeros(n,1)-2;
v2 = zeros(n-1,1)+1;
v3 = zeros(1,1)+1;
D1 = diag(v1);
D2 = diag(v2,1);
D3 = diag(v2,-1);
D4 = diag(v3, n-1);
D5 = diag(v3, 1-n);
D = D1+D2+D3+D4+D5;
disp(D);

%%
a = [-2 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1];
D = toeplitz(a);
disp(D);

%%
format rat
a = [1 2 3 4 5 6 7 8];
X = toeplitz(a);
for i=1:8
    for j=1:8
        if i>j
            X(i,j) = 0;
        end
    end
end
disp(X);

%%
format rat
a = [1 1/2 1/3 1/4 1/5 1/6 1/7 1/8];
X = toeplitz(a);
disp(X);
```

Output:

Enter n: 5

```
  -2   1   0   0   1

   1  -2   1   0   0

   0   1  -2   1   0

   0   0   1  -2   1
```

1 0 0 1 -2

Output 2:

-2 1 0 0 0 0 0 0 0 0 0 0 0 0 0 1

1 -2 1 0 0 0 0 0 0 0 0 0 0 0 0 0

0 1 -2 1 0 0 0 0 0 0 0 0 0 0 0 0

0 0 1 -2 1 0 0 0 0 0 0 0 0 0 0 0

0 0 0 1 -2 1 0 0 0 0 0 0 0 0 0 0

0 0 0 0 1 -2 1 0 0 0 0 0 0 0 0 0

0 0 0 0 0 1 -2 1 0 0 0 0 0 0 0 0

0 0 0 0 0 0 1 -2 1 0 0 0 0 0 0 0

0 0 0 0 0 0 0 1 -2 1 0 0 0 0 0 0

0 0 0 0 0 0 0 0 1 -2 1 0 0 0 0 0

0 0 0 0 0 0 0 0 0 1 -2 1 0 0 0 0

0 0 0 0 0 0 0 0 0 0 1 -2 1 0 0 0

0 0 0 0 0 0 0 0 0 0 0 1 -2 1 0 0

0 0 0 0 0 0 0 0 0 0 0 0 1 -2 1 0

0 0 0 0 0 0 0 0 0 0 0 0 0 1 -2 1

1 0 0 0 0 0 0 0 0 0 0 0 0 0 1 -2

Output 3

1 2 3 4 5 6 7 8

0 1 2 3 4 5 6 7

0 0 1 2 3 4 5 6

0 0 0 1 2 3 4 5

0 0 0 0 1 2 3 4

0	0	0	0	0	1	2	3
0	0	0	0	0	0	1	2
0	0	0	0	0	0	0	1

Output 4:

1	1/2	1/3	1/4	1/5	1/6	1/7	1/8
1/2	1	1/2	1/3	1/4	1/5	1/6	1/7
1/3	1/2	1	1/2	1/3	1/4	1/5	1/6
1/4	1/3	1/2	1	1/2	1/3	1/4	1/5
1/5	1/4	1/3	1/2	1	1/2	1/3	1/4
1/6	1/5	1/4	1/3	1/2	1	1/2	1/3
1/7	1/6	1/5	1/4	1/3	1/2	1	1/2
1/8	1/7	1/6	1/5	1/4	1/3	1/2	1