Name: Amal S. Thundiyil
UID: 2020400066
Batch: IT-D

Scilab No. : 2

Title: **Basic Commands of SCILAB**

Program 1: Write a program to extract Real and Imaginary part of the given matrix

Code:

```
clc;
printf("Amal Thundiyil - SE IT D\n")
A = [1+%i*3 5 3+%i*2; 3+%i*2 5 7+%i*8; 9 7 0+%i*99];
printf("The matrix A is");
disp(A);
printf("The real part of matrix A is");
disp(real(A));
printf("The imaginary part of A is");
disp(imag(A));
```

Output:

```
Amal Thundiyil - SE IT D
The matrix A is
   1. + 3.i   5. + 0.i   3. + 2.i
   3. + 2.i   5. + 0.i   7. + 8.i
   9. + 0.i   7. + 0.i   0. + 99.i
The real part of matrix A is
   1.   5.   3.
   3.   5.   7.
   9.   7.   0.
The imaginary part of A is
   3.   0.   2.
   2.   0.   8.
   0.   0.   99.
```

Program 2: Write a program to find diagonal and conjugate of the matrix

Code:

```
clc
printf("Amal Thundiyil - SE IT D\n")
A = [12 22 32 68; 42 52 62 77;  11 21 31  84; 24 55 66 10];
printf("The matrix A is:")
disp(A)
printf("The conjugate of the A is")
disp(diag(A))
printf("The conjugate of A is")
disp(conj(A))
```

Output:

```
Amal Thundiyil - SE IT D
The matrix A is:
   12.   22.   32.   68.
   42.   52.   62.   77.
   11.   21.   31.   84.
   24.   55.   66.   10.
The conjugate of the A is
   12.
   52.
   31.
   10.
The conjugate of A is
   12.   22.   32.   68.
   42.   52.   62.   77.
   11.   21.   31.   84.
   24.   55.   66.   10.
```

Program 3: Write a program to generate an identity matrix of size n, then generate its determinant,trace and inverse

Code:

```
clc
printf("Amal Thundiyil - SE IT D\n")
A = eye(3, 3)
printf("Identify matrix is:")
disp(A)
printf("The determinant is")
disp(det(A))
printf("The trace of A is")
disp(trace(A))
printf("The inverse of A is")
disp(inv(A))
```

Output:

```
Amal Thundiyil - SE IT D
Idnetify matrix is:
   1.   0.   0.
   0.   1.   0.
   0.   0.   1.
The determinant is
   1.
The trace of A is
   3.
The inverse of A is
   1.   0.   0.
   0.   1.   0.
   0.   0.   1.
```

Program 4: Write a program to generate an identity matrix of size n, then generate its determinant,trace and inverse

Code:

```
clc
printf("Amal Thundiyil - SE IT D\n")
A = [12 22 32 68; 42 52 62 77;  11 21 31  84; 24 55 66 10];
printf("The matrix A is:")
disp(A)
printf("Diagonal matrix A is")
printf("Diagonal Matrix is")
disp(eye(4, 4).*A)
```

Output:

```
Amal Thundiyil - SE IT D
The matrix A is:
   12.   22.   32.   68.
   42.   52.   62.   77.
   11.   21.   31.   84.
   24.   55.   66.   10.
Diagonal matrix A isDiagonal Matrix is
   12.   0.    0.    0.
   0.    52.   0.    0.
   0.    0.    31.   0.
   0.    0.    0.    10.
```

Program 5: Write a program to output the 2nd row and 3rd column from the given 4*4 matrix

Code:

```
clc;
printf("Amal Thundiyil - SE IT D\n")
A = [12 22 32 68; 42 52 62 77;  11 21 31  84; 24 55 66 10];
printf("The matrix A is:");
disp(A);
printf("The 3rd column of A is");
disp(A(:,3));
printf("The 2nd row of A is");
disp(A(2,:));
```

Output:

```
Amal Thundiyil - SE IT D
The matrix A is:
   12.   22.   32.   68.
   42.   52.   62.   77.
   11.   21.   31.   84.
   24.   55.   66.   10.
The 3rd column of A is
   32.
   62.
   31.
   66.
The 2nd row of A is
   42.   52.   62.   77.
```

Program 6: Write a program to Output of the 8th element of the given 4*4 matrix

Code:

```
clc;
A = [12 22 32 68; 42 52 62 77;  11 21 31  84; 24 55 66 10];
printf("The matrix A is");
disp(A)
printf("The 8th element of the matrix is")
disp(A(8))
printf("The rank of matrix is");
disp(rank(A))
```

Output:

```
The matrix A is
   12.   22.   32.   68.
   42.   52.   62.   77.
   11.   21.   31.   84.
   24.   55.   66.   10.
The 8th element of the matrix is
   55.
The rank of matrix is
   4.
```

Program 7: Write a program to input a matrix, find the product and sum of all the elements of A. Also, find the row-wise and column-wise sum and product of the matrix.

Code:

```
clc;
A = [1 3 5; 2 4 1; 1 2 3];
printf("the matrix A is");
disp(A);
S=sum(A);
printf("the sum of all entries is");
disp(S);
P = prod(A);
printf("the product of all entries is");
disp(P);
B=sum(A, 'r');
printf("the sum of column is");
disp(B);
C=sum(A,'r');
printf("the sum of row is");
disp(C);
D = prod(A, 'r');
printf("the product of the column is");
disp(D);
E=prod(A, 'c');
printf("the product of the row is");
disp(E);
```

Output:

```
the matrix A is
   1.   3.   5.
   2.   4.   1.
   1.   2.   3.
the sum of all entries is
   22.
the product of all entries is
   720.
the sum of column is
   4.   9.   9.
the sum of row is
   4.   9.   9.
the product of the column is
   2.   24.   15.
the product of the row is
   15.
   8.
   6.
```

Program 8: Write a program to Extract real as well as the imaginary parts of the 4x4 matrix. then show the upper triangular and lower triangular matrix of the same. also extract a diagonal matrix of the same and then if the determinant is non zero output the inverse also.

Code:

```
printf("Amal Thundiyil 2020400066 SE IT - D\n");
A=[1+%i*3 5 3+%i*5 7+%i*10;3+%i*2 5 7+%i*8 44+%i*20;9 7 0+%i*99
56+%i*19;5 96 24+%i*10 100+%i*54];
printf("The matrix A is");
disp(A);
printf("The imaginary matrix is");
disp(imag(A));
printf("The real matrix is");
disp(real(A));
printf("The lower triangular matrix is");
disp(tril(A));
printf("The upper triangular matrix is");
disp(triu(A));
printf("The diagonal of matrix A is");
disp(eye(4,4).*A);
printf("The determinant of matrix A is");
disp(det(A));
printf("The inverse of matrix A is");
disp(inv(A));
```

Output:

```
Amal Thundiyil 2020400066 SE IT - D
The matrix A is
   1. + 3.i   5.  + 0.i   3.  + 5.i    7.   + 10.i
   3. + 2.i   5.  + 0.i   7.  + 8.i    44.  + 20.i
   9. + 0.i   7.  + 0.i   0.  + 99.i   56.  + 19.i
   5. + 0.i   96. + 0.i   24. + 10.i   100. + 54.i
The imaginary matrix is
   3.   0.   5.    10.
   2.   0.   8.    20.
   0.   0.   99.   19.
   0.   0.   10.   54.
The real matrix is
   1.   5.    3.    7.
   3.   5.    7.    44.
   9.   7.    0.    56.
   5.   96.   24.   100.
The lower triangular matrix is
   1. + 3.i   0.  + 0.i   0.  + 0.i    0.   + 0.i
   3. + 2.i   5.  + 0.i   0.  + 0.i    0.   + 0.i
   9. + 0.i   7.  + 0.i   0.  + 99.i   0.   + 0.i
   5. + 0.i   96. + 0.i   24. + 10.i   100. + 54.i
The upper triangular matrix is
   1. + 3.i   5. + 0.i   3. + 5.i    7.   + 10.i
   0. + 0.i   5. + 0.i   7. + 8.i    44.  + 20.i
   0. + 0.i   0. + 0.i   0. + 99.i   56.  + 19.i
   0. + 0.i   0. + 0.i   0. + 0.i    100. + 54.i
The diagonal of matrix A is
   1. + 3.i   0. + 0.i   0. + 0.i    0.   + 0.i
   0. + 0.i   5. + 0.i   0. + 0.i    0.   + 0.i
   0. + 0.i   0. + 0.i   0. + 99.i   0.   + 0.i
   0. + 0.i   0. + 0.i   0. + 0.i    100. + 54.i
The determinant of matrix A is
   948764. + 280365.i
The inverse of matrix A is
         column 1 to 2
   0.0874722 - 0.3629039i  -0.0699032 + 0.0124566i
   0.0223975 + 0.0013339i  -0.0311107 - 0.0072111i
   0.0218263 - 0.0054643i   0.0003253 + 0.0095364i
  -0.0178256 + 0.0256193i   0.0281708 - 0.0112337i
         column 3 to 4
   0.0072972 + 0.0129306i  -0.0014471 + 0.0173096i
   0.0007135 + 0.0015978i   0.0108185 + 0.0001896i
  -0.0016622 - 0.0102154i  -0.0010325 + 0.0005328i
  -0.001112  + 0.0010379i  -0.0004577 - 0.0008249i
```