Linear Algebra LAB

Week Two

Practical No. 2

Basic Commands in Scilab & conditional branching and iteration

* To enter matrix with complex elements

A=[1 2+%i 4;3-4*%i 9 -2;2 -5 1-%i];
disp(A);

Exercise: Display real and imaginary part of A

disp(rand(3,3)*10);
disp(int(rand(3,3)*10));

OUTPUT

// Displaying given matrix with complex elements

$$1. + 0.i \quad 2. + i \quad 4. + 0.i$$
$$3. - 4.i \quad 9. + 0.i \quad -2. + 0.i$$
$$2. + 0.i \quad -5. + 0.i \quad 1. - i$$

//Displaying random matrix of order 3 with elements from 0 to 9

$$2.1132487 \quad 3.3032709 \quad 8.4974524$$
$$7.5604385 \quad 6.653811 \quad 6.8573102$$
$$0.0022113 \quad 6.2839179 \quad 8.7821648$$

// Displaying random matrix of order 3 with integer elements from 0 to 9

$$0. \quad 7. \quad 2.$$
$$5. \quad 1. \quad 2.$$
$$6. \quad 5. \quad 2.$$

```matlab
B=[1 3 5;2 4 1;1 2 3];
disp(B);

disp(rref (B));

disp(A.*B);

disp(A*B);

disp(1./B);
```

OUTPUT

//Displaying given matrix B

```
1.  3.  5.
2.  4.  1.
1.  2.  3.
```

//Displaying reduced row echelon form of B

```
1.  0.  0.
0.  1.  0.
0.  0.  1.
```

//Displaying element wise multiplication of A & B

```
1.      6. + 3.i  20.
6. - 8.i  36.      -2.
2.      -10.      3. - 3.i
```

//Displaying multiplication of A & B

```
9. + 2.i   19. + 4.i   19. + i
19. - 4.i  41. - 12.i  18. - 20.i
-7. - i    -12. - 2.i  8. - 3.i
```

// Displaying reciprocal of elements of B

```
1.   0.3333333  0.2
0.5    0.25     1.
1.     0.5      0.3333333
```

```
disp(sqrt(25));

disp(sin(%pi/2));

x= 3^2;
disp(x);
disp(1/x);
```

OUTPUT

5.

1.

9.

0.1111111

EXERCISE

1. *Create random matrix of order 3 with numbers between 0 and 10*

2. *Create column vector of size 4X1, integers between 0 and 10*

Conditional branching

if-then

Structure is as follows

if condition

      statement1

else

      statement2

end

To check whether given number is greater than 10

```
clc;
a=5;
if a>10 then
printf("a is more than 10");
else
 printf("a is smaller than 10");
end
```

OUTPUT

a is smaller than 10

Write a program to check whether you are attending Linear Algebra lab for any time input from user.

```
clc;
t=input("Enter the current time: ")
 if t>16 & t<18
then
 printf("student is attending Linear Algebra Lab");
else
printf("Student has finished Linear Algebra Lab")
end
```

OUTPUT

Enter the current time: 19.00

Student has finished Linear Algebra Lab

Enter the current time: 17.50

student is attending Linear Algebra Lab

EXERCISE

1. Enter a month(number) from a user and check whether its a first, second, third or fourth quarter.

2. Take a number from user and check whether it is even or odd.
Hint: Use modulo command
modulo(n, m) gives remainder when n is divided by m

Program

```
clc;
 month = input("Enter a month: ")
if month >=1 & month <=3
 then
 printf("first quarter");
elseif month >= 4 & month <= 6
 then
printf("second quarter");
elseif month >= 7 & month <=9
 then
 printf("third quarter");
elseif  month >= 10 & month <=12
then
 printf("fourth quarter");
else
printf("Invalid month");
 end
```

Output

Enter a month: 8

third quarter

Enter a month: 11

fourth quarter

Enter a month: 14

Invalid month

Program

```
clc;
x=input("Enter the number to be checked: ")
if modulo(x,2)==0 then
  disp('The number is even') ;
else
disp('The number is odd');
 end
```

Output

Enter the number to be checked: 13

   "The number is odd"

Enter the number to be checked: 28

   "The number is even"

For & while loops in Scilab

```
for expression
    instructions
end
```

```
while condition
    instructions
end
```

Using for loop

Program

```
clc;

for a=10:1:20

printf("Value of a: %d\n",a);

end
```

Output

Value of a: 10
Value of a: 11
Value of a: 12
Value of a: 13
Value of a: 14
Value of a: 15
Value of a: 16
Value of a: 17
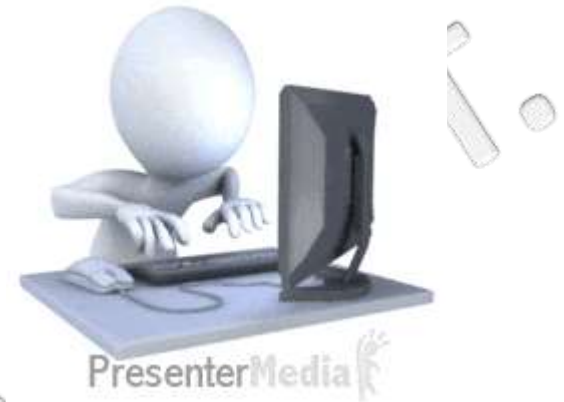Value of a: 18
Value of a: 19
Value of a: 20

Using while loop

Program

```
a=10;

while a<=20

printf("\nValue of a: %d",a);

 a=a+1;

end
```

Output
```
Value of a: 10
Value of a: 11
Value of a: 12
Value of a: 13
Value of a: 14
Value of a: 15
Value of a: 16
Value of a: 17
Value of a: 18
Value of a: 19
Value of a: 20
```

Exercise

Write a program to find values for x=1 to 5 for
f(x)=$x^2 + \sqrt{x}$ using for and while loop.

Program

```
clc;

for x= 1:1:5

 f(x)= x^2 + sqrt(x);

 printf('\nThe value of f(x)= %f at x= %i',f(x),x )

end

//using while loop

printf("\n***************************");

 x=1;

 while x<=5

   f(x)= x^2 + sqrt(x);

   printf('\nThe value of f(x)= %g at x= %i',f(x),x )

    x=x+1;

 end
```

Output

```
The value of f(x)= 2.000000 at x= 1
The value of f(x)= 5.414214 at x= 2
The value of f(x)= 10.732051 at x= 3
The value of f(x)= 18.000000 at x= 4
The value of f(x)= 27.236068 at x= 5


***************************

The value of f(x)= 2 at x= 1
The value of f(x)= 5.41421 at x= 2
The value of f(x)= 10.7321 at x= 3
The value of f(x)= 18 at x= 4
The value of f(x)= 27.2361 at x= 5
```