Indian Institute of Information Technology Vadodara

MA202: Numerical Techniques Lab
Semester: IV
Lab 1

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Section : **2A**

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Note: I have PDF from next page using matlab only. Part1: From que 1 to 9. Part2: que 10. Part3: From que 11 to 14. Part4: From que 15 to 19.

I have merged them all.

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Question-1

```
a=1.2; b=2.3; c=4.5; d=4;
e = a.^3 + sqrt(b.*d) - 4*c;
disp('Result: ')
disp(e)
```

```
Result:
  -13.2388
```

Question-2

```
A = ones(1,10);
disp('Array of ones with 10 elements:')
disp('Solution:')
disp(A)
B = [2 3 zeros(1, 8)];
disp('Second array:')
disp(B)
```

```
Array of ones with 10 elements:
Solution:
     1     1     1     1     1     1     1     1     1     1

Second array:
     2     3     0     0     0     0     0     0     0     0
```

Question-3

```
A = [4 -6; 6 10];
B = [6 -13; 3.4 16];
disp('Solution: ')
disp('A+B :')
disp(A+B)
disp('B*B: ')
```

```
disp(B*B)
disp('AB: ')
disp(A*B)
disp('Transpose of AB:')
disp((A*B).')
disp('A-B: ')
disp(A-B)
disp('A/B: ')
disp(A/B)
disp('Inverse of A:')
disp(inv(A))
```

```
Solution:
A+B :
   10.0000  -19.0000
    9.4000   26.0000

B*B:
   -8.2000 -286.0000
   74.8000  211.8000

AB:
    3.6000 -148.0000
   70.0000   82.0000

Transpose of AB:
    3.6000   70.0000
 -148.0000   82.0000

A-B:
   -2.0000    7.0000
    2.6000   -6.0000

A/B:
    0.6020    0.1141
    0.4422    0.9843

Inverse of A:
    0.1316    0.0789
   -0.0789    0.0526
```

Question-4

```
A = [5 6 10; -3 0 14; 0 -7 21];
B = [4 10 0].';
C = [A B];
disp('Result')
disp('Value of x when we use Gauss Jordan elimination is :')
disp(rref(C))
disp('Value of x when use A inverse is :')
disp(A\B)
syms x y z;
```

```
e1 = 5*x + 6*y + 10*2 == 4;
e2 = -3*x + 14*z == 10;
e3 = -7*y + 21*z == 0;
solution = solve([e1, e2, e3], [x, y, z]);
disp('Value of x when we use solve function is :')
disp([solution.x solution.y solution.z].')
```

```
Result
Value of x when we use Gauss Jordan elimination is :
    1.0000         0         0   -1.4545
         0    1.0000         0    1.2078
         0         0    1.0000    0.4026

Value of x when use A inverse is :
   -1.4545
    1.2078
    0.4026

Value of x when we use solve function is :
-101/31
   3/62
   1/62
```

Question-5

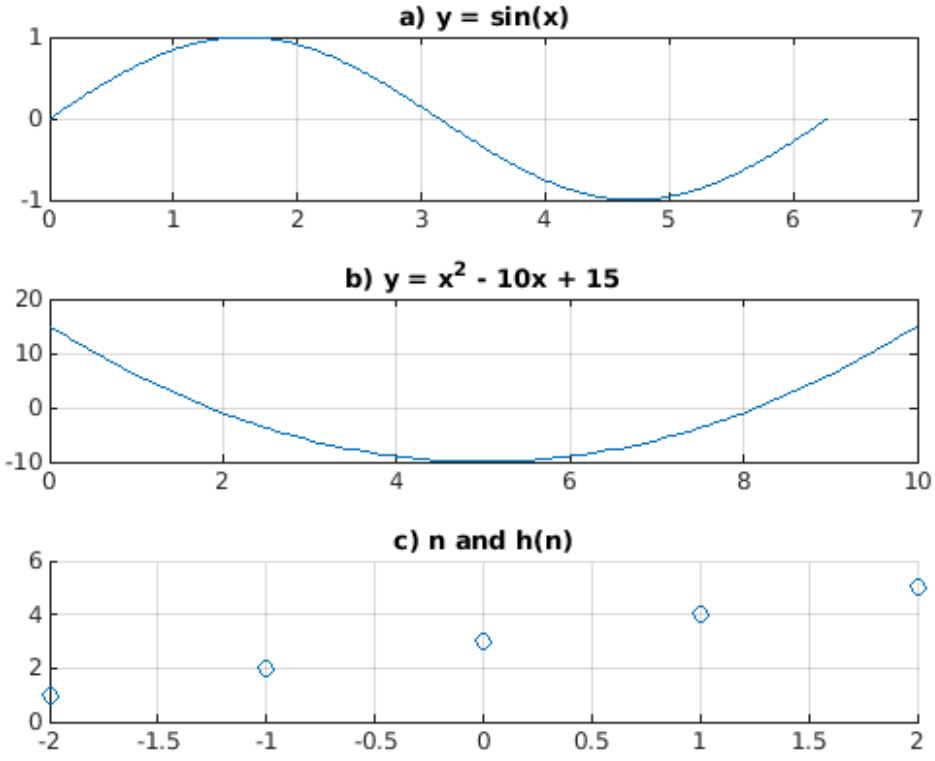
```
A = linspace(1, 30, 30);
p = sign(sin(A))==1;
disp('Integers between 1 and 30, whose sine is negative are :');
disp('Solution:')
disp(A(p));
```

```
Integers between 1 and 30, whose sine is negative are :
Solution:
  Columns 1 through 13

     1     2     3     7     8     9    13    14    15    19    20
 21    26

  Columns 14 through 15

    27    28
```

Question-6

```
tiledlayout (3, 1)
nexttile
x = linspace(0, 2*pi, 360);
y = sin(x);
plot(x,y)
grid on;
title('a) y = sin(x)')
```

```
nexttile
x = linspace(0, 10, 100);
y = x.^2 - 10*x + 15;
plot(x, y)
grid on;
title('b) y = x^2 - 10x + 15')
nexttile
n= linspace(-2, 2, 5);
h= linspace(1, 5, 5);
scatter(n, h)
grid on;
title('c) n and h(n)')
```



Question-7

```
A=[3 2 -2; -3 -1 3; 1 2 0];
disp('Representation of matrix A is: ')
disp(A)
pol = poly(A);
rot = roots(pol);
disp('Roots of characteristic equation of matrix A is:')
disp(rot)
[V, D] = eig(A);
disp('The eigenvectors of matrix A is :')
disp(V)
disp('The eigenvalues of matrix A are :')
```

```
disp(diag(D))
```

```
Representation of matrix A is:
     3     2    -2
    -3    -1     3
     1     2     0

Roots of characteristic equation of matrix A is:
   -1.0000
    2.0000
    1.0000

The eigenvectors of matrix A is :
   -0.5774    0.7071    0.0000
    0.5774   -0.0000    0.7071
   -0.5774    0.7071    0.7071

The eigenvalues of matrix A are :
   -1.0000
    1.0000
    2.0000
```

Question-8

```
C = -50 + (50 + 50)*rand(1, 10);
disp('The temperatures in degree centigrade(C) are :')
disp(C.')
F = 9*C/5 +32;
disp('The temperatures in degree Fahrenheit(F) are :')
disp(F.')
Final = [C' F'];
disp('The final matrix with temperature values in C as the first
 column and in F as the second column' )
disp(Final)
```

```
The temperatures in degree centigrade(C) are :
   -6.1256
  -11.8442
   26.5517
   29.5200
  -31.3127
   -1.0236
   -5.4414
   14.6313
   20.9365
   25.4687

The temperatures in degree Fahrenheit(F) are :
   20.9740
   10.6805
   79.7930
   85.1360
  -24.3629
```

```
   30.1576
   22.2055
   58.3363
   69.6857
   77.8436

The final matrix with temperature values in C as the first column and
 in F as the second column
   -6.1256   20.9740
  -11.8442   10.6805
   26.5517   79.7930
   29.5200   85.1360
  -31.3127  -24.3629
   -1.0236   30.1576
   -5.4414   22.2055
   14.6313   58.3363
   20.9365   69.6857
   25.4687   77.8436
```

Question-9

```
C = -50 + (50 + 50)*rand(1, 10);
disp('The temperatures in degree centigrade(C) are :')
disp(C);
F=ctof(C);
disp('The temperatures in degree Fahrenheit(F) are :')
disp(F)
function fun = ctof(c)
    fun = 9*c/9+32;
end

The temperatures in degree centigrade(C) are :
  Columns 1 through 7

  -22.3975   17.9703   15.5098  -33.7388  -38.1002   -0.1636   45.9744

  Columns 8 through 10

  -15.9614    8.5268  -27.6188

The temperatures in degree Fahrenheit(F) are :
  Columns 1 through 7

    9.6025   49.9703   47.5098   -1.7388   -6.1002   31.8364   77.9744

  Columns 8 through 10

   16.0386   40.5268    4.3812
```

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Question-10

```
num = 5;
disp(['The Factorial of ' num2str(num) 'is: ' num2str(fact(num))])
function func = fact(num)
    func = prod(1:num);
end
```

```
The Factorial of 5is: 120
```

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Question-11 1
Question-12 1
Question-13 1
Question-14 2

Question-11

```
x=-3;
if x>0
    str='positive';
elseif x<0
    str='negative';
elseif x== 0
    str='zero';
else
    str='error';
end
disp('Solution: ')
disp(str)
```

```
Solution:
negative
```

Question-12

```
x=-10;
while x~=0
    x=x+1;
end
disp( 'Solution: ')
disp(x)
```

```
Solution:
     0
```

Question-13

```
X=0;
for i=1:10
    X=X+1;
end
disp('Solution   :')
disp(X)
```

```
Solution   :
    10
```

Question-14

```
number = 10;
disp('Solution :')
disp(['The sum of first' num2str(number) 'integers are: '
 num2str(s(number))])
function func = s(number)
    func = sum(1:number);
end
```

```
Solution :
The sum of first10integers are: 55
```

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Question-15 1
Question-16 1
Question-17 1

Question-15

```
x=-10;
while x~=0
    x=x+2;
    if x == -2
        break;
    end
end
disp('Result :')
disp(x)
```

```
Result :
    -2
```

Question-16

```
threeheads = 0;
for i = 1:1000
    number = 0;
    for j = 1:4
    if rand(1,1) < 0.75
        x = 1;
    else
        x = 0;
    end
    number = number + x;
    end
    if number == 3
    threeheads = threeheads +1;
    end
end
disp('Result :')
disp('The probability of 3 heads in 4 tosses of a coin is :')
disp( threeheads/1000);
```

```
Result :
The probability of 3 heads in 4 tosses of a coin is :
    0.4380
```

Question-17

```
disp('Sum of all even integers from 1 to 1000 is:')
```

```
addalleven(1:1000)
function y = addalleven(x)
    evenint = x(2:2:end);
    y = sum(evenint);
end

Sum of all even integers from 1 to 1000 is:

ans =

      250500
```

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