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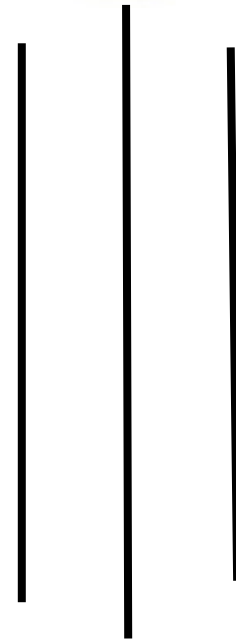
(AFFILIATED TO POKHARA UNIVERSITY)

Changunarayan, Bhaktapur

REPORT ON:

Numerical Methods lab-1

SUBMITTED BY: SUBMITTED TO:

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Experiment No: 1

TITLE:

INTRODUCTION TO MATLAB

OBJECTIVE:

To become familiar with the MATLAB software by introducing the basic features, commands, and function

1. *Basic Components of the MATLAB Environment*
   - ➢ **Command Window:**

     The Command Window enables you to enter individual statements at the command line, indicated by the prompt (>>). As you enter statements, the Command Window displays the results.

     * To execute commands in the MATLAB environment

   - ➢ **Current Directory Window:**

     The Current Folder browser enables you to interactively manage files and folders in MATLAB. Use the Current Folder browser to view, create, open, move, and rename files and folders in the current folder.

     * To quickly access files on the MATLAB path

   - ➢ **Figure Window**

     Figure creates a new figure window using default property values. The resulting figure is the current figure.

     *To display graphical output from MATLAB code

   - ➢ **Workspace Window**

     The workspace contains variables that you create or

import into MATLAB from data files or other programs. You can view and edit the contents of the workspace in the Workspace browser or in the Command Window.
*To view variable definitions and variable memory allocations

2. *Matrices Operations A= [2 2 1; 1 3 4; -1 1 -1] B= [2 3 0; 2 5 4; -1 0 2] * Compute A+B, A-B, A*B, A.*B, Inverse of A, Transpose of A, Transpose of B.*

In matlab command window

>> A=[2 2 1;1 3 4;-1 1 -1] % matrix A(3*3) is intialized in variable A

A =

```
   2    2    1
   1    3    4
  -1    1   -1
```

>> B=[2 3 0;2 5 4;-1 0 2] % matrix B(3*3) is intialized in variable B

B =

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

>> A+B %Adding Two Matrix A and B

ans =

```
    4    5    1
    3    8    8
   -2    1    1
```

>> A-B %Subtracting Two matrix A and B

ans =

```
    0   -1    1
   -1   -2    0
    0    1   -3
```

>> A*B % Multiplication of Two matrix A and B

ans =

```
    7   16   10
    4   18   20
    1    2    2
```

>> A*B % Multiplication of Two matrix A and B as both are square matrix of 3*3

ans =

```
    7   16   10
```

```
   4   18   20
   1    2    2
```

>> inv(A) %The inverse of matrix A

ans =

```
   0.4375  -0.1875  -0.3125
   0.1875   0.0625   0.4375
  -0.2500   0.2500  -0.2500
```

>> A' % Transpose of matrix A

ans =

```
   2   1  -1
   2   3   1
   1   4  -1
```

>> B' %Transpose of matrix B

ans =

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

>> % Example of Access the specific elements of the matrix
>> A(2,1) % A(Row,Column) this way we can get the required
element of matrix

ans =

   1

>> B(3,3)

ans =

   2

>> A(end) % To Acess the last element of matrix

ans =

   -1

>> B(end-1) %To Acess the second last element of matrix of b
that is 4

ans =

   4

>> A(5) % This way also we can acess the element of matrix
but the number goes column wise and answer of this line is 3

ans =

   3

```
>> %Generate Identity matrix, matrix of zeros and matrix of
ones using eye (), zeros () and ones () commands.
>>
>> A=eye(3) %3 by 3 identity matrix

A =

    1   0   0
    0   1   0
    0   0   1

>> B=zeros(5) %if the all element of matrix is needed by zero

B =

    0   0   0   0   0
    0   0   0   0   0
    0   0   0   0   0
    0   0   0   0   0
    0   0   0   0   0

>> C= ones(4) % if all the element of matrix is one

C =

    1   1   1   1
    1   1   1   1
    1   1   1   1
    1   1   1   1
```

3. *Compute the value of the expression*

$y1 = e\text{power} (-a)in(x) + 10 \sqrt{y}$ For a=5, x =2 and y= 8

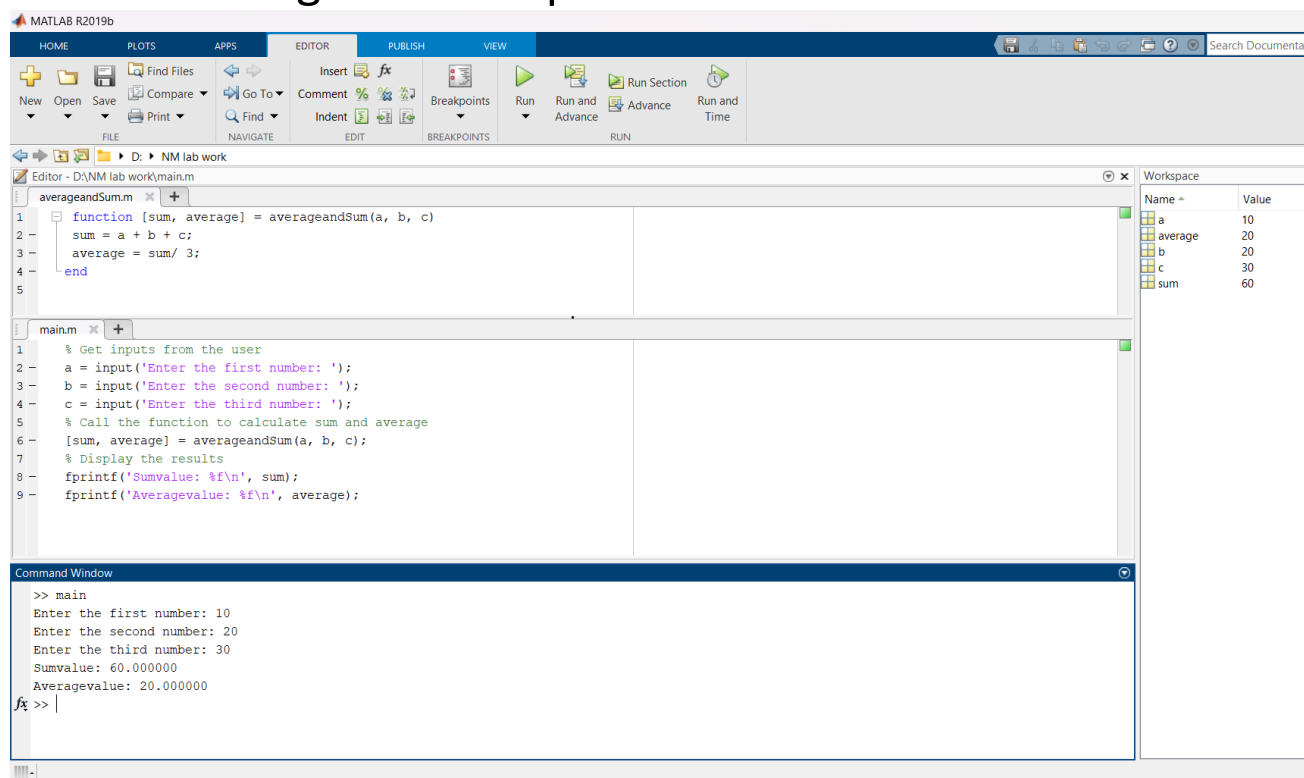a=5; %the given value of a, x and y are initialized

\>> x=2;

\>> y=8;

\>> y1=exp(-a)*sin(x)+10*sqrt(y) % The given expression

y1 =

28.2904

4. Write MATLAB script to perform following tasks:
   - Write a program which takes three inputs from users and display sum and average value. Also, perform the same task using the concept of function.

MATLAB R2019b

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              Print ▼   Find ▼   Indent             Advance             Time
      FILE          NAVIGATE        EDIT           BREAKPOINTS    RUN
```

D: ▶ NM lab work

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averageandSum.m

```
1   function [sum, average] = averageandSum(a, b, c)
2       sum = a + b + c;
3       average = sum/ 3;
4   end
5
```

main.m

```
1       % Get inputs from the user
2       a = input('Enter the first number: ');
3       b = input('Enter the second number: ');
4       c = input('Enter the third number: ');
5       % Call the function to calculate sum and average
6       [sum, average] = averageandSum(a, b, c);
7       % Display the results
8       fprintf('Sumvalue: %f\n', sum);
9       fprintf('Averagevalue: %f\n', average);
```

Workspace

Name ▲	Value
a	10
average	20
b	20
c	30
sum	60

Command Window

```
>> main
Enter the first number: 10
Enter the second number: 20
Enter the third number: 30
Sumvalue: 60.000000
Averagevalue: 20.000000
fx >>
```

- Take a number as an input and display whether it is odd or even. [Use if – else Condition]


```matlab
1    % The question is solve in m-file of matlab
2
3    %getting the number from the user
4    number = input('Enter a(your Crn) number:');
5
6    %Checking whether the given number is odd or even
7    %Here the number is divided by 2 and remainder is checking for '0'
8
9    if rem(number,2)==0
10       %for even condition
11   disp('The enter number is even');
12      %for odd condition using else
13   else
14       %for odd condition
15       disp('The Roll Number is:');
16   end
```
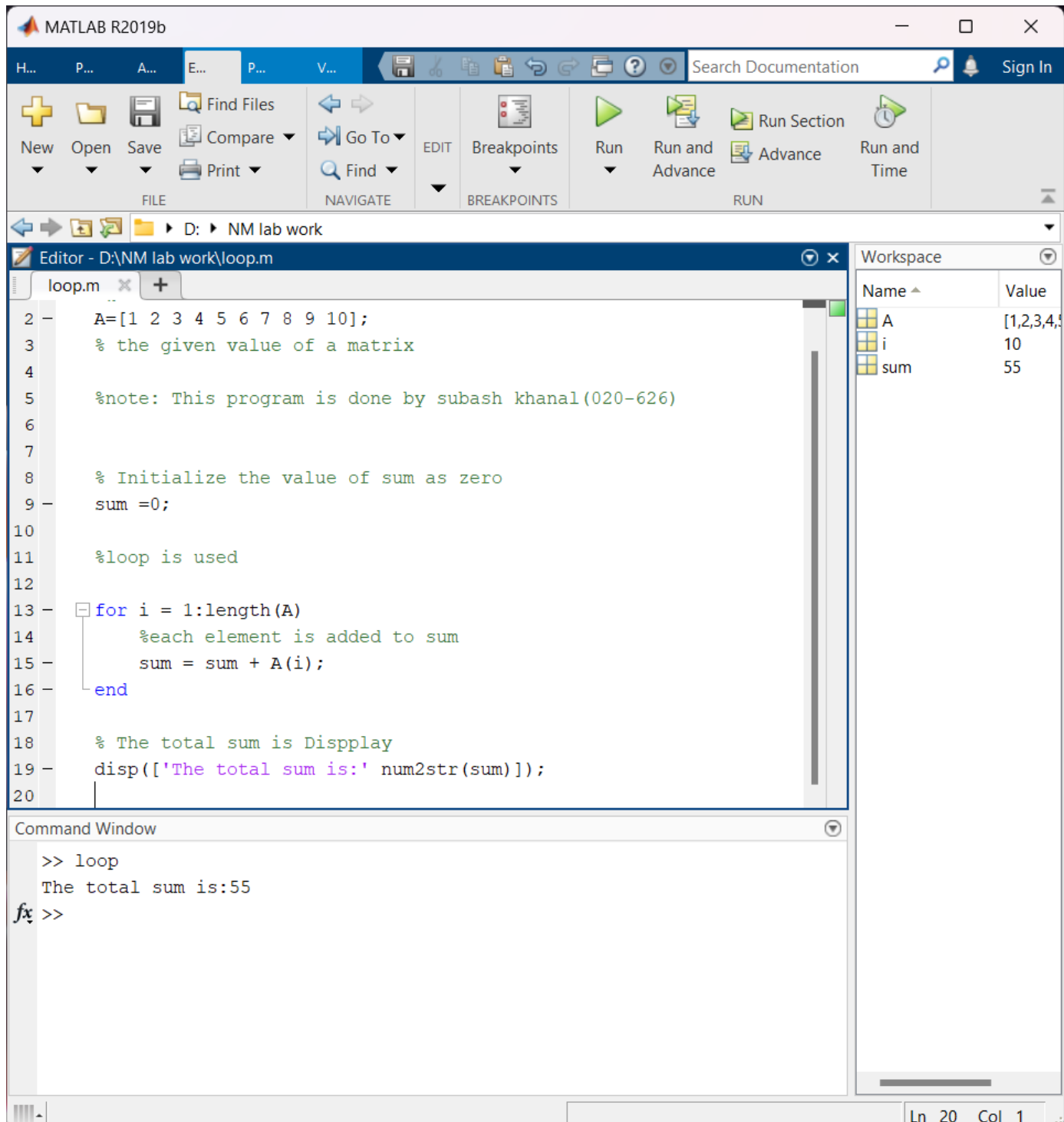
Command Window
```
>> question
Enter a(your Crn) number:20
The enter number is even
>> question
Enter a(your Crn) number:626
The enter number is even
fx >>
```

- Given, A = [1 2 3 4 5 6 7 8 9 10]. Calculate sum using for loop.

```
A=[1 2 3 4 5 6 7 8 9 10];
% the given value of a matrix

%note: This program is done by subash khanal(020-626)


% Initialize the value of sum as zero
sum =0;

%loop is used

for i = 1:length(A)
    %each element is added to sum
    sum = sum + A(i);
end

% The total sum is Dispplay
disp(['The total sum is:' num2str(sum)]);
```

Command Window
```
>> loop
The total sum is:55
fx >>
```

- Use for loop to calculate the sum of the first n terms of the series$\sum_{k=1}^{n}\frac{(-1)^k k}{2^k}$. Take n as an input.

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                   Print ▾   Find ▾

FILE   NAVIGATE   BREAKPOINTS   RUN

D: ▸ NM lab work

Editor - D:\NM lab work\addition.m   Workspace

addition.m × +

Name ▲	Value
k	10
n	10
sum	-0.2188

```matlab
1    %Question number 4(d)
2
3    %Taking the input from user for the value of n
4    n=input('Enter the value of n:');
5
6    %The value of sum is set to be zero
7    sum =0;
8    %using for loop to sum
9    for k=1:n
10       sum=sum+(-1)^k*k/2^k;
11   end
12
13   %The display
14   disp(['The sum is :',num2str(sum)]);
15   disp('The work is done by subash khanal 020-626');
```
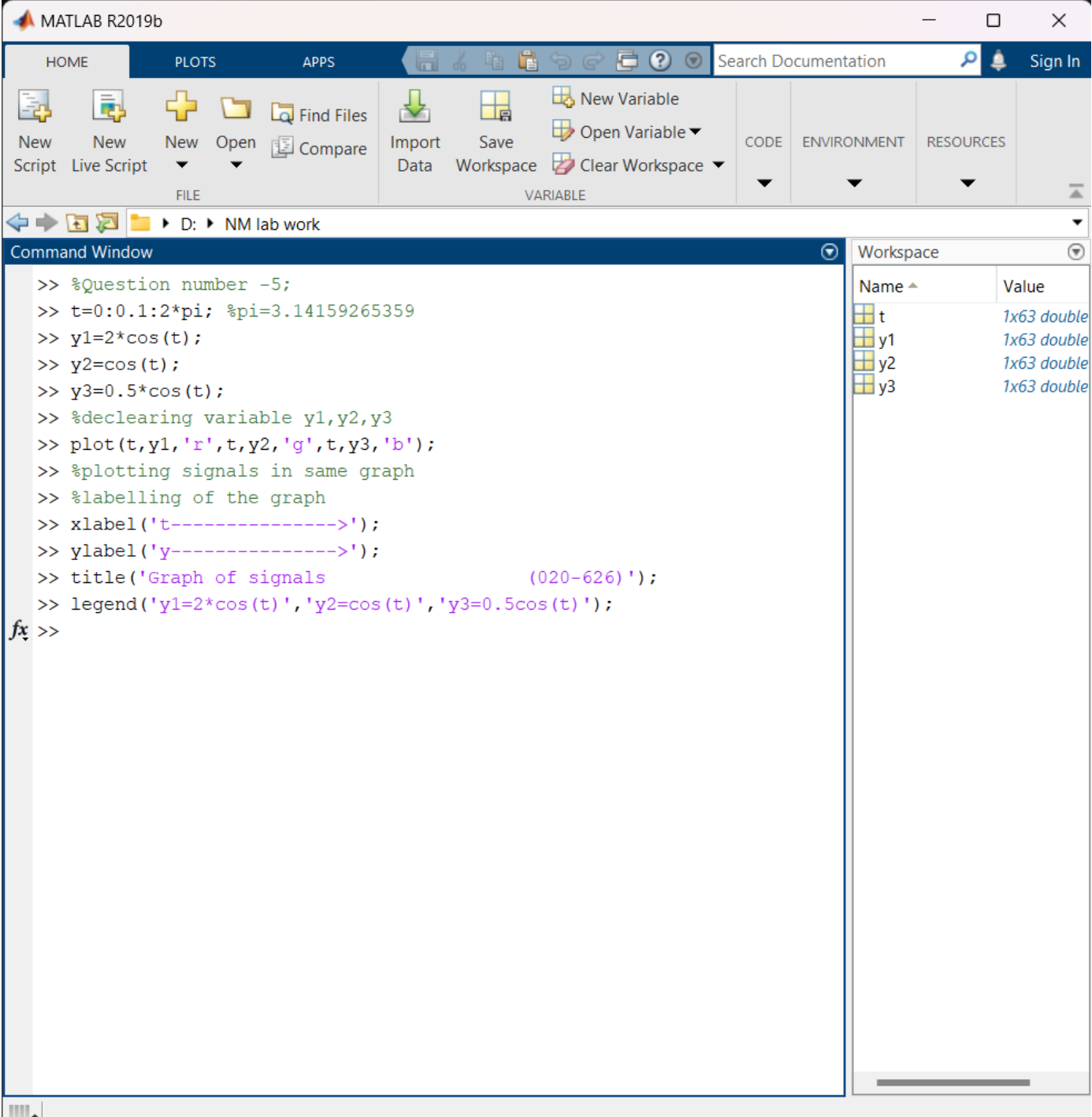
Command Window

```
>> %The work is done by subash khanal 020-626
>> addition
Enter the value of n:10
The sum is :-0.21875
The work is done by subash khanal 020-626
fx >>
```

5.Given $y1 = 2cos(t)$, $y2 = cos(t) and$ $y3 = 0.5cos(t)$ in the interval of $0 \le t \le 2\pi$. Obtain the graph of these different signals in same plot taking t as an independent variable.



```
>> %Question number -5;
>> t=0:0.1:2*pi; %pi=3.14159265359
>> y1=2*cos(t);
>> y2=cos(t);
>> y3=0.5*cos(t);
>> %declearing variable y1,y2,y3
>> plot(t,y1,'r',t,y2,'g',t,y3,'b');
>> %plotting signals in same graph
>> %labelling of the graph
>> xlabel('t-------------->');
>> ylabel('y-------------->');
>> title('Graph of signals              (020-626)');
>> legend('y1=2*cos(t)','y2=cos(t)','y3=0.5cos(t)');
fx >>
```

Graph of the above problem

File   Edit   View   Insert   Tools   Desktop   Window   Help

Graph of signals   (020-626)

Legend:
- y1=2*cos(t)
- y2=cos(t)
- y3=0.5cos(t)
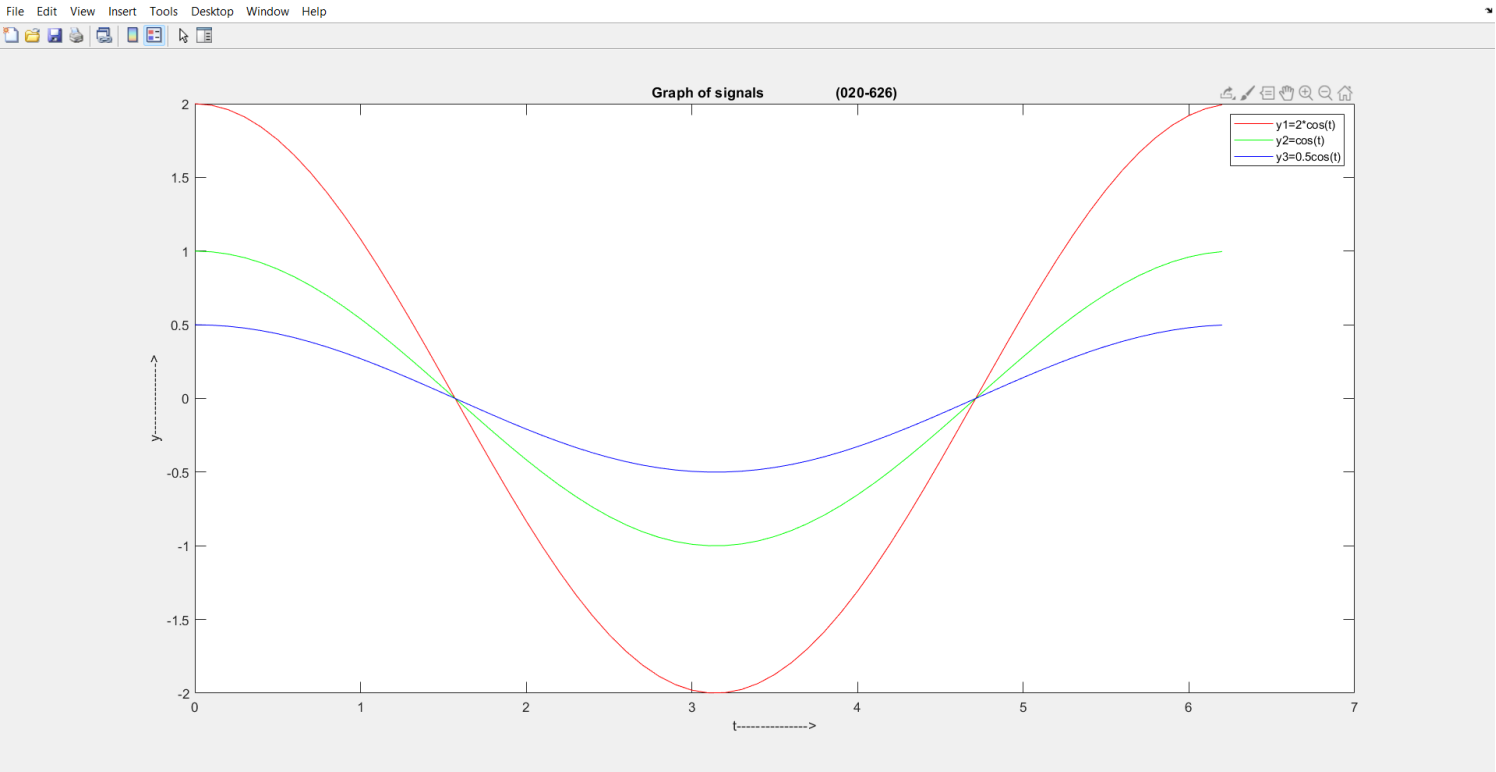
6. Create Anonymous function for the expression $x^2 - 5x + 6$
And compute its value for x = 2 and x =5

MATLAB R2019b

```
f=@(x)x^2-5*x+6;
%when x=2;
x1=2;
result1=f(x1);
disp(['The value f(x) when x=2  =',num2str(result1)]);

%when x=5;
x2=5;
result2 = f(x2);
disp(['The value f(x) when x=5  =',num2str(result2)]);
disp('SUBASH KHANAL(020-626)')
```

Command Window

```
>> anonfunction
The value f(x) when x=2  =0
The value f(x) when x=5  =6
SUBASH KHANAL(020-626)
fx >>
```

Workspace

Name	Value
f	@(x)x^2-5*x
result1	0
result2	6
x1	2
x2	5

Conclusion:-

Hence, we are familiar with basic of Matlab software by understanding the commands and function.