Arithmetic Operations in MATLAB

Objective:

To provide hands-on practice in MATLAB, covering arithmetic operations and vector operations

1. Perform the following calculations in MATLAB

a. 136+564

```
Command Window
>> a=136+564;
disp(a)
   700
```

b. 255×67

```
Command Window
>> b=255*67

b =

       17085
```

c. 12.36/5.68

```
Command Window

>> c=12.36/5.68

c =

    2.1761
```

d. $\sin(\frac{\pi}{6})$

```
Command Window
>> d=sin(pi/6)

d =

    0.5000
```

e. $e0.76$

```
Command Window
>> e=exp(0.76)


e =

    2.1383
```

f. √5

```
Command Window
>> f=sqrt(5)

f =

    2.2361
```

g. K =$(3 + 2(3^2 + \sqrt{8})^3$

```
Command Window
>> k=(3+2*((3^2)+sqrt(8)))^3

k =

   1.8942e+04
```

2. Enter the following variables: a = 123456, b= $3^{(1/4)}$, c = cos $(\frac{\pi}{2})$.
Now calculate

```
Command Window
>> a=123456;
>> b=3^(1/4);
>> c=cos(pi/2);
```

a. (a+b)/c

```
Command Window
>> (a+b)/c

ans =

   2.0162e+21
```

b. 2a - 3b

```
Command Window
>> 2*a-3*b

ans =

   2.4691e+05
```

c. $c^2 - \sqrt{a-b}$

```
Command Window
>> c^2 -sqrt(a-b)

ans =

 -351.3612
```

d. a / (3b + 4c)

```
Command Window
>> a/(3*b+4*c)

ans =

   3.1269e+04
```

e. exp($a^{1/4} - b^{10}$)

```
Command Window
>> exp(a^(1/4)-b^10)

ans =

   23.4818
```

3. Find the MATLAB functions for the inverse trigonometric functions; sin^{-1} , cos^{-1} tan^{-1}. Then calculate;

a. $sin^{-1}(0.5)$

```
Command Window
>> asin(0.5)

ans =

    0.5236
```

b. $cos^{-1}(\sqrt{3}/2)$

```
Command Window
>> acos(sqrt(3)/2)

ans =

    0.5236
```

c. $tan^{-1}(2)$

```
Command Window
>> atan(2)

ans =

    1.1071
```

d. Convert your answers from radians to degrees.

```
Command Window
>> rad2deg(0.5236)

ans =

   30.0001
```

```
>> deg2rad(30)

ans =

    0.5236
```

4. Using vectorization and the colon operator, use a single command each to generate.

a. The first 15 cubes

```
Command Window

>> v=(1:15).^3

v =

  Columns 1 through 6

           1           8          27          64         125         216

  Columns 7 through 12

         343         512         729        1000        1331        1728

  Columns 13 through 15

        2197        2744        3375
```

b. The values $\sin\left(\frac{n\pi}{16}\right)$ for n from 1 to 16

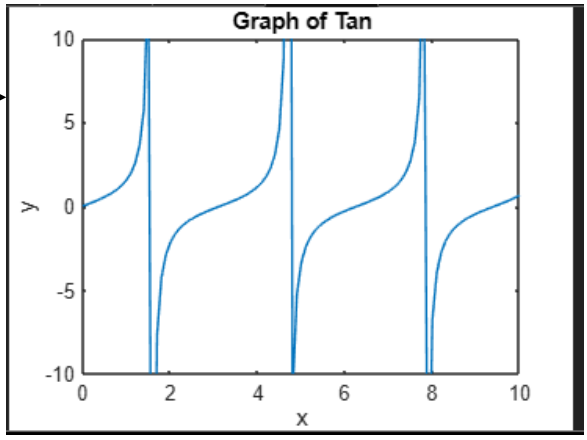
```
Command Window
>> n=[1:16]

n =

  Columns 1 through 13

     1     2     3     4     5     6     7     8     9    10    11    12    13

  Columns 14 through 16

    14    15    16

>> sin(n*pi/16)

ans =

  Columns 1 through 7

    0.1951    0.3827    0.5556    0.7071    0.8315    0.9239    0.9808

  Columns 8 through 14

    1.0000    0.9808    0.9239    0.8315    0.7071    0.5556    0.3827

  Columns 15 through 16

    0.1951    0.0000
```

c. The values $\sqrt{n}$ for n from 10 to 20 (Do it in two methods)

```
Command Window
>> n=[10:20]

n =

    10    11    12    13    14    15    16    17    18    19    20

>> sqrt(n)

ans =

  Columns 1 through 7

    3.1623    3.3166    3.4641    3.6056    3.7417    3.8730    4.0000

  Columns 8 through 11

    4.1231    4.2426    4.3589    4.4721
```

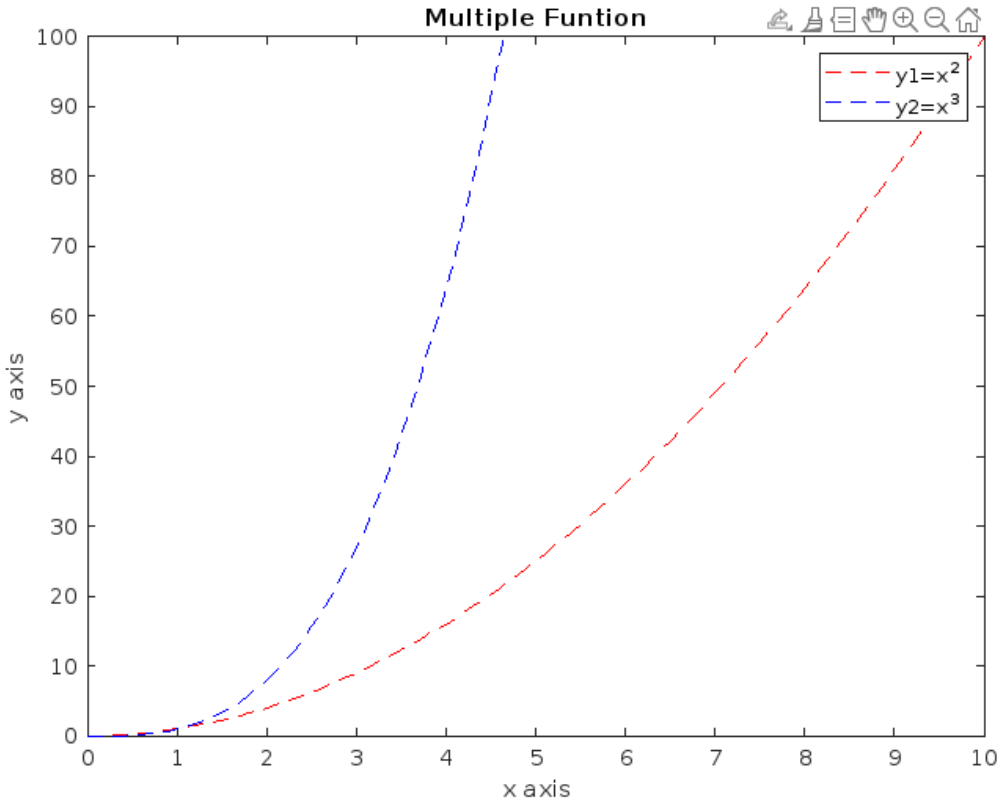
5. a. Plot the function tan(x) with the following commands x= [0:0.1:10]; plot(x,tan(x)) figure, plot(x,tan(x)), axis([0,10 ,- 10,10])

```
/MATLAB Drive/q5.m
1  x=[0:0.1:10];
2  y=tan(x);
3  figure;
4  plot(x,y)
5  xlabel("x")
6  ylabel("y")
7  title('Graph of Tan')
8  axis([0,10,-10,10])
9
```



b. Plot the multiple functions on the same graph using “hold” command x = 0 : 0.1 : 10
functions: x^2 and x^3

```
x=[0:0.1:10];

y1=x.^2;
y2=x.^3;

figure;
plot(x,y1,'--r');
hold on;
plot(x,y2,'--b')
hold off;

xlabel("x axis");
ylabel("y axis");
title('Multiple Funtion');
legend('y1=x^2','y2=x^3');
axis([0,10,0,100])
```



6. Extra Exercises

1. Write a MATLAB code to verify the following trigonometric identity at x = $\pi/3$.

$$\frac{cos2x}{2} = \frac{tanx+sinx}{2tanx}$$

```
/MATLAB Drive/q6.m
1  x=pi/3;
2  LHS=cos(x/2)^2
3  RHS=(tan(x)+sin(x))/(2*tan(x))
```

```
Command Window

LHS =

    0.7500


RHS =

    0.7500
```

2. Calculate the sum of the even numbers between 2 to 20 and display the output using "disp" command.

```
/MATLAB Drive/q6b.m
1  even=2:2:20
2  sum=sum(even);
3  disp(["The sum of even numbers ",num2str(sum)])
4
```

```
Command Window

even =

     2     4     6     8    10    12    14    16    18    20

    "The sum of even numbers "    "110"
```

3. Convert the temperature value Celsius to Fahrenheit Output:

Enter the temperature in Celsius: 30

Temperature in Fahrenheit: 80