***MATLAB***

**Matrix\_1:**

**%matrix row**

**a=[1 2 4 5 6]**

**b=[1,2,3,4,5]**

**%matrix colum**

**c=[1 2 3;2 3 4;4 5 6]**

**size(c)**

**[m,n]=size(c)**

**% D=c' transpose row to colum and vise-versa**

**%e=1:5 matrix 1 2 3 4 5**

**e=1:5**

**%f=1:0.5:5 distance 0.5**

**f=1:0.5:5**

**%g=10:-2:1 decresing**

**g=10:-2:1**

**h=[1,3,4,6,8,9]**

**%adding first element**

**i=[10,h]**

**% adding last**

**j=[i,5]**

**%specific elements j(row,colum)**

**j(1,2)**

**%row print**

**j(1,:)**

**%colum print**

**j(:,2)**

**%all row and colum**

**j(:,:)**

**%replacing**

**j(1,2)=8**

**%submetrix**

**j(2,3:2,3)**

**k=[c(2,1),c(2,3);c(3,1),c(3,3)]**

**Matrix\_2:**

**a=[1 2 3;4 5 6;7 8 9]**

**%delete**

**a(1,2)=0**

**%row delete**

**a(3,:)=[]**

**%restor**

**a=[a(1,:);a(2,:);[7 8 9]]**

**%multipele line matrix**

**b=[1 2 3;...**

**4 5 6;...**

**7 8 9]**

**%concatening matrix**

**c=[1 2 3;4 5 6;7 8 9]**

**d=[c;c;c]**

**%null matrix**

**zeros(3,2)**

**%unite matrix**

**ones(5,5)**

**ones(3,3)\*2**

**%diagonal value**

**%diag(c)**

**%diagonal matrix**

**e=[1 2 3]**

**diag(e)**

**%colum enterchange left to right**

**f=[1 2 3;4 5 6;7 8 9]**

**fliplr(f)**

**%row enterchange up to down or transport materix**

**flipud(f)**

**%identity matrix all value 0 without diagonal value 1**

**eye(3)**

**%magic matrix sum of every row ,colum & diagonal 15**

**magic(3)**

**%linspace a row vector space a to b in space differt**

**%linspace(a,b,v)**

**linspace(0,3,5)**

**%random matrix 0 to 1**

**rand(2,3)**

**%random 0 t0 10**

**rand(3,3)\*10**

**Matrix\_operation:**

**%arithmatic matrix**

**a=[1 2 3;4 5 6;7 8 9]**

**b=[8 9 10;11 12 13;14 15 16]**

**%addition**

**a+b**

**%subtraction**

**a-b**

**%multipication**

**a\*b**

**%division**

**a/b**

**%left division**

**a\b**

**%expnentiation**

**a^2**

**%array muli a row & row same element multi**

**a.\*b**

**%array and matrix (+,-) same but others defferents**

**%matrix operation**

**%determination value**

**det(a)**

**%inversion**

**inv(b)**

**%summation of colum to row**

**sum(b) % 33 36 39**

**%summation of row to colum**

**sum(b,2)**

**% trabsformation to row**

**sum(b')**

**%trace/diagonal summation**

**trace(b)**

**%trace(diag(a))**

**% others trace**

**%trace(diag(fliplr(a)))**

**c=[ 1 6 3 8 9]**

**max(c)**

**min(c)**

**d=[1 2 3;4 5 6;7 8 9]**

**max(d) %colum wise max 7 8 9**

**max(max(d)) % matrix wise max 9**

**%unique element**

**unique(d)**

**d**

**abs(d)**

**%length**

**size(d) %row and colum size 3 3**

**length(d) %grater size between row and colum**

**%sort matrix colum by colum**

**e=[5 3 -6;8 -66 0;4 7 -11]**

**sort(e)**

**%sort descent**

**sort(e,'descend')**

**%sort matrix row by row**

**sort(e,2)**

**%defferet colum wise element**

**diff(e)**

**%defrent colum wise but last to first**

**cumsum(e)**

**Trigonometric & functional expression:**

**clc**

**clear all**

**close all**

**%clc comment remove**

**%clear all**

**%close all**

**%sin radious**

**sin(34)**

**%inverse sin**

**asin(45)**

**%sin degree**

**sind(55)**

**%sin heighparabolla**

**sinh(45)**

**%forword/divided**

**5/4**

**%backword\inverse devided**

**5\3**

**exp(5)**

**log(5)**

**log10(1000)**

**pi**

**sqrt(4)**

**4^4**

**abs(-5)**

**%rem(5,4) remainder**

**rem(4,3)**

**%sign(-7)**

**sign(-7)**

**gcd(3,4)**

**lcm(4,5)**

**%factorial(5) 5\*4\*3\*2\*1**

**factorial(5)**

**%factor(6) 3 2**

**factor(6)**

**%primes(5) 2 3 5**

**primes(5)**

**round(8,6)**

**clc**

**clear all**

**close all**

**a=(1/(2+3^2)+((4/5)\*(6/7)))**

**Vector:**

**%row vector**

**c=[1 2 3]**

**%colum**

**d=[1;2;3]**

**a=[2 3 4]**

**b=[5 6 4]**

**%dot . scelar**

**dot(a,b)**

**%or**

**%sum(a.\*b)**

**%a\*b'**

**%cross vector**

**cross(a,b)**

**%angle**

**e=input('enter a= ')**

**f=input('enter b= ')**

**x=sqrt(a(1,1)^2+a(1,2)^2+a(1,3)^2);**

**y=sqrt(b(1,1)^2+b(1,2)^2+b(1,3)^2);**

**angle=acosd((dot(a,b))/(x\*y))**

**%simultaneus**

**g=[1 2 3; 4 5 6;7 8 9]**

**h=[1;1;1]**

**%x=g^-1 \*h or a\b**

**x=inv(g)\*h**

**x=g\h**

**Plot\_1:**

x=[1 2 3 4 5]

y=[2 6 5 8 2]

plot(x,y)

t=0:15:360;

x=sind(t);

y=cosd(t);

plot(t,x,'r:\*');

hold on %add two x,y in same plot

plot(t,y,'g','LineWidth',5); %LineWidth line mota

%plot(t,x,'r:\*',t,y,'g');

title('sin & cos function')

xlabel('t')

ylabel('x & y')

text(180,0,'\rightarrow This is text')

grid on

grid minor

%figure('Name','Sin','Color,'k')

%plot(t,x)

subplot(3,1,1)

plot(t,x)

subplot(3,1,2)

plot(t,y)

subplot(3,1,3)

plot(t,x,t,y)

legend('Sin','Cos')

**Plot\_2: for descreat**

t=0:15:360;

x=sind(t);

stem(t,x)

t=0:pi/100:pi;

y=sin(x);

polar(x,y)

x=0:0.5:50;

y=5\*x.^2

semilogx(x,y)

grid on

semilogy(x,y)

grid on

loglog(x,y)

grid on

x=[1 2 5 4 8];

y=[1 6 2;3 4 5];

bar(x)

bar(y)

barh(y) %horizontal

bar3(y) %3d

pie3(y)

z=[4 2 6 1 7 0 9 5 10]

hist(z,14) %histogram devided plot

a=randn(1000,1);

b=10\*sin(x) + randn(1000,1)

plot(a,b)

figure

scatter(a,b,300,'d','r','filled')

**plot\_3:**

clc;

close all;

clear all;

x=linspace(0,10\*pi,1000)

y=cos(x);

z=sin(x)

plot3(x,y,z)

grid on

comet3(x,y,z) %animated version

% Surface plots:

%a.Mesh/2d: n\*m

z=[1,2,3,4,5

6,7,8,9,10

2,4,6,8,9]

mesh(z)

a=linspace(1,5,10);

b=linspace(5,10,3);

m=[1,2,3,4,5,6,7,8,9,10,2,4,6,8,9,3,7,3,6,2,1]

mesh(a,b,m)

surf(x,y,m)

colormap(cool)

shading flat

clc;

close all;

clear all;

[x y z]=peaks;

surf(x,y,z)

subplot(2,2,1)

mesh(x,y,z)

subplot(x,y,z)

surf(x,y,z)

subplot(2,2,3)

contour(x,y,z)

subplot(2,2,4)

pcolor(x,y,z)

clc;

close all;

clear all;

[x y z]=peaks;

surf(x,y,z)

colormap(cool)

shading flat

shading interp

xlevel('text')

ylevel('text')

zlevel('text')

text(x,y,'text')

text(x,y,'text')

title('text')

text(x,y,'text')

clc;

close all;

clear all;

[x y z]=peaks;

surf(x,y,z)

xlabel('x axis')

ylabel('y axis')

zlabel('z axis')

title('peaks')

text(2,4,4,'D A polash')

axis tight

axis([-2 2 0 4 0 10])

clc;

close all;

clear all;

[x y z]=sphere; %globe

surf(x,y,z)

clc;

close all;

clear all;

[x y z]=cylinder; %cylinder

surf(x,y,z)

clc;

close all;

clear all;

x=1:3

y=1:5

[X Y]=meshgrid(x,y)

f=X.^2+Y.^4

surf(x,y,f)

***Complex:***

3+4i

complex(5,6)

%abs means resultant

x=6+4i

abs(x) % resultant given

sqrt(3^2+4^2)

angle(x)

atan(4/3)

atand(4/3)

real(x)

imag(x)

isreal(x)

conj(x)

x' %conj

clock

fix(clock)

date

plot(x,'r\*')

stem(real(x),'r\*')

stem(imag(x),real(x),'r\*')

***input\_formating:***

clc;

close all;

clear all;

z=input('Enter a value: ')

%z=input('Enter a value: ','s') %string

%number to string

x=1:5;

disp(['The value of x: ' num2str(x)])

disp(x)

clc;

close all;

clear all;

%numaaric deta type:

a=int8(10) %8 bit

intmax('int8')

intmax('uint8')

%floting point

a=1;

format compact

whos

b=1:10;

whos

%vector:

c=[1 2 3 ;4 5 6]

whos

realmax('double')

realmax('single')

realmax

d=single(5)

double(d)

f=5+3i

g=int8(5+3i)

g=single(5+3i)

%string

a='polash'

a(5)

a(2)

b='Matlab is Fun'

%ascii

double('a')

char(98)

['a',98]

c=['one';'two'] %same len of charector

d=char('one','two','three')

e=[98;84;73]

t=[d,e]

n=num2str(d)

t[d,n]

disp([d,n]) %display remove cottetion

%symbolic deta type:

syms x y

[-x y;2\*y -y]

%logic

m=[true false true]

%sparse arrays:

p=eye(1000)

sparse(p) %just 1 save

%cell arrays

A=1:3;

B='abcdefg';

C=single([1 2 3;4 5 6]);

mycell={A,B,C}

celldisp(mycell)

mycell(1)

mycell{2}

mycell{3} (1,2) %3 number means matrix 1,2 elements

cellplot(mycell)

%structue:

s=struct('name','polash','phone','01788939870')

s.a=1

s.b={'a' 'b' 'c'}

class(s.b) %cell

isfield(s,'a') %1

isfield(s,'c') %0

rmfield(s,'a') %

setfield(s,'gender','m')

s.contact.email='as@gmail.com'

***output\_formating:***

format shortE %scientific 2

pi

format short eng %3

pi

format short g %5

pi

format bank % 2

pi

format hex

pi

format +

%5.63 +

%-4 -

format long % 14

pi

realmax

realmax('single')

realmax('double')

realmin

intmax

intmin

***Relational\_logical function:***

format compact

2>3

a=[2 -1;-3 5]

a<0

a>0

b=[0 -1;2 5]

a==b

%logic

1|0 %1

1|1 %1

0|0 %0

~1 %0

~0 %1

xor(1,0) %0

any(0) %0

any(5) %1

any([1 0 1]) %1

any([0 0 0]) %0

all([1 1 1]) %1

all([1 0 1]) %0

spiral(5) %matrix

s=spiral(3)

s>6

find(s>6)

height=[43,56,78,32,42,76]

accept=find(height>60) %position

height(accept) %ascending

***structure:***

clc;

close all;

clear all;

city=input('Enter your city name: ','s')

switch city

case 'dhaka'

disp('Capital city of BD')

case 'rajshahi'

disp('Welcome to silk city')

otherwise

disp('Not in file')

end

clc;

close all;

clear all;

city=menu('Enter your city name: ','Dhaka','Rajshahi')

switch city

case 1

disp('Capital city of BD')

case 2

disp('Welcome to silk city')

end

%for loops

for k=[1 3 5 7 ] % (1:7)

k

end

for k=1:5

x=k\*k

end

for k=1:5

x(k)=5^k

end

% 5 25 125 625 3125

%factorial

clc;

close all;

clear all;

n=input('Enter an number:')

f=1;

for k=1:n

f=f\*k;

end

fprintf('Factorial of %d is %d',n,f)

% While loops

%infinite number of all times

clc;

close all;

clear all;

n=0;

while n<3

n=n+1

a(n)=n^5 % 1 32 243

end

clc;

close all;

clear all;

% 1+2+3+...+n

n=1;

while sum(1:n)<=1000

n=n+1

end

fprintf('N=%d',n)

%mean

clc;

close all;

clear all;

n=0;s=0;

x=input('Enter a Value:')

while x>0

s=s+x;

n=n+1;

x=input('Enter next value: ')

end

m=s/n

fprintf('Mean: %d',m);

%break

clc;

close all;

clear all;

for i=1:10;

if i==3

break

end

disp(i)

end

%continue

clc;

close all;

clear all;

for i=1:10;

if i==3

continue

end

pause(1) %time running

disp(i)

end

%nested if

clc;

close all;

clear all;

a=input('Enter Passcode: ')

if a==1234

disp('You are correct')

else

if a==1111

disp('You are correct')

else

if a==0000

disp('Try again')

else

disp('wrong')

end

end

end

clc;close all;clear all;

a=input('Enter Row: ')

b=input('Enter colum: ')

for i=1:b

for j=1:b

fprintf('\*')

pause(0.12)

if i==j

fprintf(' ')

break

end

end

fprintf('\n')

end

% Function

function[outputArg1,outputArg2]=untitled(inputArg1,inputArg2)

% untailed Summary of this function goes here

% Detailed explaination goes here

outputArg1=inputArg1;

outputArg2=inputArg2;

end

function [y] = is\_odd(x)

% is\_odd returns 1 if x is odd

% returns 0 if x id even

y=mod(x,2)

end

%new

function [a,b]=sum\_sub(x,y)

%sum\_sub can add & substruction

a=x+y;

b=x-y;

end

%example no input & output

function []= star()

% star can plot a star in polar plot

theta =pi/2:0.8\*pi:4.8\*pi;

r = ones(1,6);

polar(theta,r)

% star comamand window

nargIn('sin')

nargout('sin')

%1

nargin('rem') %2

nargin('surf') %-1

%accessable

type('sphere')

%set\_path

pathtool

%anonymous function

ln= @(x) log(x)

whos

clear

load ('structure.m')

save anonymous.mat ln

load anonymous.mat

***calculas:***

%%

%integration

%most f: int ,integral1,integral2,integral3,

%preious version: quad,quad1,quad2d,quaddv,quadgk

%%

% Numeric

%q=integral(fun,xmin,xmax)

clc;close all;clear all;

fun = @(x) log(x);

q1=integral(fun,0,1)

clc;close all;clear all;

fun1=@(x) exp(-x.^2).\*log(x).^2;

q2=integral(fun1,0,inf)

clc;close all;clear all;

syms x z

y=x^3 +z^3

int(y,'z','a','b')

%pretty(ans) book style

%differentiation

syms x

f= exp(x)\*sin(x)

diff(f)

***signal:***

clc;close all;clear all;

A=1;f=1;t=0:0.001:1;

phase=0;

x=A\*sin(2\*pi\*f\*t+phase);

%plot(t,x)

stem(t,x,'r:','LineWidth',2)

xlabel('n','FontSize',20)

ylabel('x[n]','Frontsize',20)

title('Sinusoidal Signal','Frontsize',20)

clc;close all;clear all;

t=0:360;

x=sind(t);

y=cosd(t);

plot(t,x,'r:','LineWidth',5)

hold on;

plot(t,y,'g';'LineWidth',5)

% amplitude

clc;close all;clear all;

A=1;f=1;t=0:0.001:1;

phase=0;

x=A\*sin(2\*pi\*f\*t+phase);

y=5\*x

plot(t,y)

axis([-2 7 -5 5])

grid on

clc;close all;clear all;

A=1;f=1;t=0:0.001:1;

phase=0;

x1=A\*sin(2\*pi\*f\*t+phase);

x2=A\*cos(2\*pi\*f\*t+phase);

y=x1+x2;

subplot(3,1,1)

plot(t,x1)

title('sin(t)')

subplot(3,1,2)

plot(t,x2)

title('cos(t)')

subplot(3,1,3)

plot(t,y)

title('sin(t)+cos(t)')

gird on

clc;close all;clear all;

t=-2:0.01:3;

x=t>=0;

plot(t,x)

%unit step signal matlab

clc;close all;clear all;

t=-2:0.01:3;

x=heaviside(t);

subplot(2,1,1)

plot(t,x);

subplot(2,1,2)

stem(t,x);

clc;close all;clear all;

t=-2:0.01:3;

x=heaviside(t-2);

subplot(2,1,1)

plot(t,x,'k','LineWidth',3);

%unit Ramp signal

clc;close all;clear all;

t=-1:0.01:1;

u=t>=0;

r=t.\*u;

stem(t,r);

clc;close all;clear all;

t=-10:10;

u=[zeros(1,10) ones(1,11)];

r=t.\*u;

subplot(2,1,1)

plot(t,r);

subplot(2,1,2)

stem(t,r);

% unit trans signal

clc;close all;clear all;

t=-2:0.01:3;

x=heaviside(t);

r=t.\*x;

plot(t+2,r,'r','LineWidth',3); %positive signal

xlabel('t');

ylabel('r(t-2)');

title('Unit ramp signal');

clc;close all ;clear all;

t=-2:0.01:10;

u=heaviside(t);

v=heaviside(t+1);

r=u-(2\*v);

plot(t,r);

%unit ramp signal /integrates:

clc;close all;clear all;

t=-1:0.001:1;

u=t>=0;

r=t.\*u(t);

stem(t,r);

clc;close all;clear al;

t=-2:0.01:3;

x=heaviside(t);

r=t.\*x;

plot(t,r)

% signum functon

clc;close all;clear all;

t=linspace(-5,5,501);

x=[-ones(1,250) 0 ones(1,250)];

plot(t,x,'r','LineWidth',3);

gird on ;

axis([-6 6 -2 2])

xlabel('x');

ylabel('y');

title('signum Function');

clc;close all;clear all;

t=linspace(-5,5);

x=sign(t);

plot(t,x,'r','LineWidth',3);

% square Wave:

clc;close all;clear all;

t=1:0.01:5;

s=square(t);

plot(t,s);

%sin to square

clc;close all;clear all;

t=1:0.001:2;

y=sin(2\*pi\*t);

h=sign(y);

plot(t,y);

hold on;

plot(t,h);

% Generate square without square function

clc;close all;clear all;

x=-8:0.01:8;

for i=1:length(x)

t=ceil(x(i));

if mod(t,2)==0;

y(i)=-1;

else

y(i)=1;

end

end

plot(x,y)

axis([-9 9 -1.5 1.5])

xlabel('x')

ylabel('Square Wave')

% Sawtooth

clc;close all;clear all;

f=2;

t=0:0.01:25;

x=sawtooth(2\*pi\*f\*t);

plot(t,x,'r','LineWidth',3);

%trangle

clc;close all;clear all;

f=2;

t=0:0.01:2;

x=tripuls(t);

plot(t,x,'r','LineWidth',3);

%sinc Function

clc;close all;clear all;

t=-10:0.01:10;

x=sinc(t);

plot(t,x);

clc;close all;clear all;

t=-10:0.01:10;

x=sin(t)./t;

plot(t,x);

% Original signal

clc;close all;clear all;

t=0:0.1:0.5;

x1=sin(2\*pi\*4\*t);

subplot(1,2,1);

plot(t,x1,'r','LineWidth',3);

xlabel('time');

ylabel('amplitude');

title('original signal');

axis([0 0.5 -2 2])

b=2;

y1=b.\*x1;

subplot(1,2,2);

plot(t,y1,'r','LineWidth',3);

xlabel('time');

ylabel('amplitude');

title('scaled signal\beta=0.5');

axis([0 0.5 -2 2])

clc;close all;clear all;

t=0:0.01:2;

x1=sin(2\*pi\*t);

x2=cos(4\*pi\*t);

y=x1+x2;

subplot(1,3,1);

plot(t,x1,'b','LineWidth',3);

subplot(1,3,2);

plot(t,x2,'g','LineWidth',3);

subplot(1,3,3);

plot(t,x3,'r','LineWidth',3);

clc;close all;clear all;

syms t;

x1=sin(t);

y1=int(x1);

fplot(x1)

grid;

figure;

fplot(y1);

grid on;

%differntiation

clc;close all;clear all;

syms t;

x=piecewise(t<0;0;0<=t<=3,1,t>3,0);

y=int(x)

fplot(t,x,'LineWidth',3);

figure;

fplot(t,y);

%time scaling;

clc;close all;clear all;

t=-3:3;

x=[0 1 2 3 2 1 0];

subplot(3,1,1);

stem(t,x,'b','LineWidth',3);

axis([-6 6 0 3]);

xlabel('time');

ylabel('amplitude');

title('original signal');

subplot(3,1,2);

stem(2\*t,x,'b','LineWidth',3);

axis([-6 6 0 3]);

xlabel('time');

ylabel('amplitude');

title('EXpand signal');

subplot(3,1,3);

stem(t/2,x,'b','LineWidth',3);

axis([-6 6 0 3]);

xlabel('time');

ylabel('amplitude');

title('compresed signal');

%time shifting

clc;close all;clear all;

t=-3:3;

x1=[0 1 2 3 2 1 0];

subplot(3,1,1);

stem(t,x1,'b','LineWidth',3);

axis([-6 6 0 3]);

xlabel('time');

ylabel('amplitude');

title('original signal');

axis([-5 5 0 3]);

%time Traversal

clc;close all;clear all;

t=0:0.01:2\*pi;

x=sin(t);

tr=-fliplr(t);

y=fliplr(x);

subplot(2,1,1);

plot(t,x);

axis([-7 7 -1 1])

subplot(2,1,2);

plot(tr,x);

axis([-7 7 -1 1]);

%energy function

clc;close all;clear all;

t=-1:0.001:3;

x=2\*(heaviside(t)-heavside(t-2));

plot(t,x,'b','LineWidth',3);

y=x.^2;

E=trapz(t,y); % integration

disp(['Energy,E= ',num2str(E),'Joules']);

clc;close all; clear all;

x=[1 2 -2];

E=sum(abs(x).^2);

disp(['Energy,E= ',num2str(E),'Joules']);

clc;close all;clear all;

syms pi t;

z1=5\*cos(pi\*t)+sin(5\*pi\*t);

z2=z1.^2;

Power=(1/2)\*int(z2,t,-1,1);