



SHRI SAKTHIKAILASSH WOMEN'S COLLEGE

(Recognized Under Section 2(f) & 12(B) of UGC Act 1956)

(Affiliated to Periyar University, Salem)



**MATLAB: MATHEMATICAL
PROCESSING**

Training session



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CHAPTER 1

LINEAR EQUATION

Solving Linear Equations

Example 1. Solve the equation ' $4x+5y= 0$ ' and ' $2x+10y= 0$ '

Step 1: Assign the variables

```
>>syms x y% symbolic variables
```

Step 2: Write the equation

```
>> a='4*x+5*y=0'
```

```
>> b='2*x+10*y=0'
```

Step 3: Use the solve command

```
>> [x,y]=solve(a,b,x,y)
```

Ans ;

x =

0

y =

0

Example 2. Solve the equations ' $2x-3y+4z = 5$ ' ' $y+4z+x = 10$ ' ' $-2z+3x+4y = 0$ '

Solution

```
syms x y z;
```

```
a = '2*x-3*y+4*z = 5'
```

```
b = 'y+4*z+x = 10'
```

```
c = '-2*z+3*x+4*y = 0'
```

```
[x,y,z] = solve(a,b,c,x,y,z)
```

Ans

```
a = 2*x-3*y+4*z = 5
```

```
b = y+4*z+x = 10
```

```
c = -2*z+3*x+4*y = 0
```

$$x = -5/37$$

$$y = 45/37$$

$$z = 165/74$$

Assignments

1. Solve the equations $'2.5x-3.7y+4.9z = 5'$

$$'x+4.8y+z = 10'$$

$$'5x+6y+4z = 0' .$$

2. Solve the equations $'6/5w+5/7x-9/4y+3/2z = 70'$

$$'7/4w+5/3x+5/4y+3/7z = 10'$$

$$'5/3w+4/7x+6/5y+4z = 50' .$$

$$'9/2w+3/5x+6/5y+4/5z = 40' .$$



CHAPTER 2

NON LINEAR EQUATION

Solving Non Linear Equations

Example 1. Solve the equation ' $4x^2+8x+4=0$ '.

Step 1: Assign the variables

```
>>syms x % symbolic variables
```

Step 2: Write the equation

```
>> eq = '4*x^2+8*x+4=0'
```

Step 3: Use the solve command

```
>> [x]=solve(eq)
```

Ans ; -1
 -1

Example 2. Solve the equation ' $16x^2+16x+4=0$ '.

```
>>syms x
```

```
>> a = '16*x^2+16*x+4=0'
```

```
>> [x]=solve(a)
```

Ans ; -1/2
 -1/2

Assignments

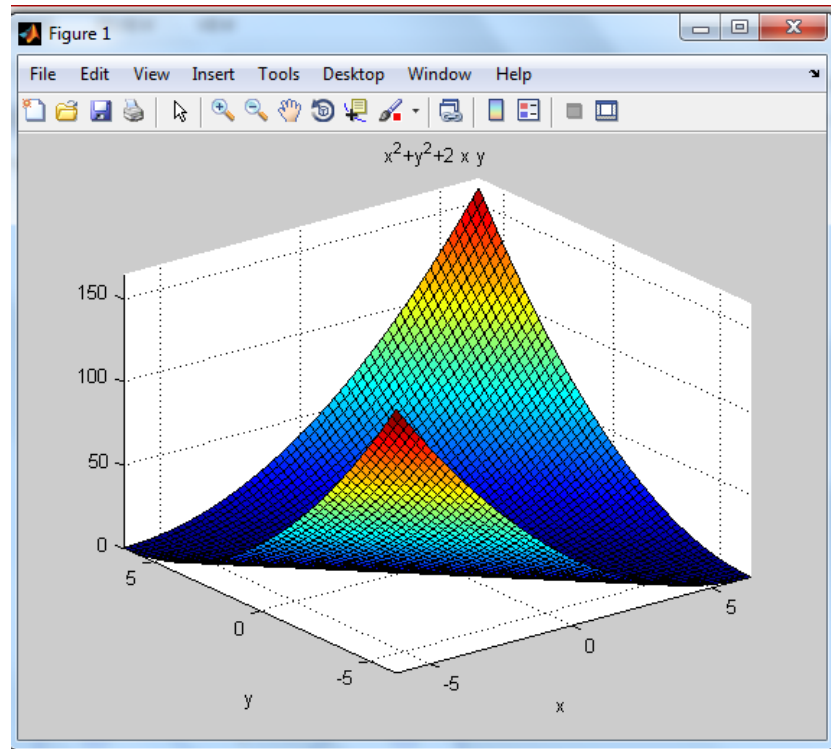
1. $a=5x^2+2x+1=0$
2. $e=9x^2+2x+4=10$
3. $f=10x^3+20x^3+10x+10=70$
4. $g=70x^4+80x^3+20x^2+10x+10=70$

CHAPTER 3

VISUAL EXPRESSION

3.1 Finding Visual Expression for 1 expression

```
clc  
syms x y  
  
a='x^2+y^2+2*x*y';  
  
figure(1)  
ezsurf(a);
```



3.2 Finding Visual Expression for 5 expression

```
clc  
syms x y
```

```
a='sqrt(4-x^2-y^2);'  
b='x^2-y^2';  
c='x^2+2';  
d='x + y';  
e='x^2+y^3-2*x*y';
```

figure(1)
ezsurf(a);

figure(2)
ezsurf(b);

figure(3)
ezmesh(c);

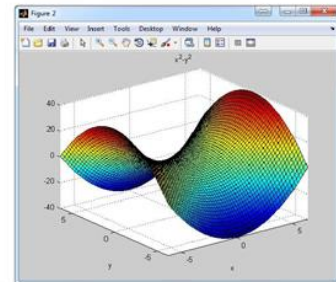
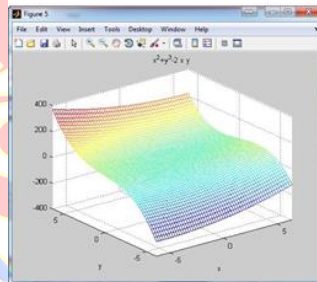
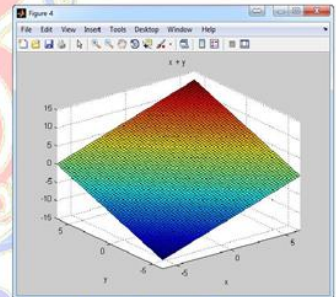
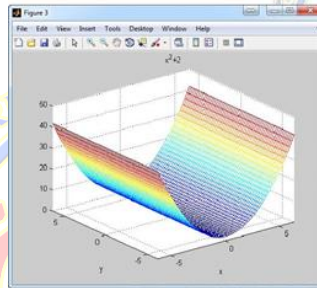
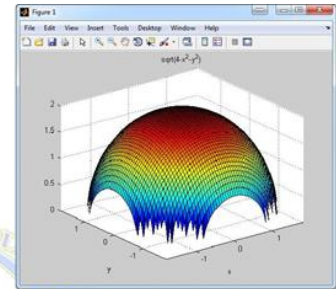
figure(4);
ezsurf(d);

figure(5);
ezmesh(e);

Assignments

Find the Visual form of

1. $a = '5x+10y'$
2. $b = '9x^2+2y^3'$
3. $c = '10x^3+20y^3+10x+10y'$
4. $d = '70x^4+80y^3+20x^2'$



CHAPTER 4

VISUAL INTERSECTION POINTS

4.1 Find the solution by plotting these two equations and looking at their intersections.

$$a = '2*x-3*y = 5';$$

$$b = 'x+y = 10';$$

Solution

```
clc
```

```
syms x y ;
```

$$a = '2*x-3*y = 5';$$

$$b = '2*x+y = 10';$$

```
[x,y] = solve(a,b,x,y)
```

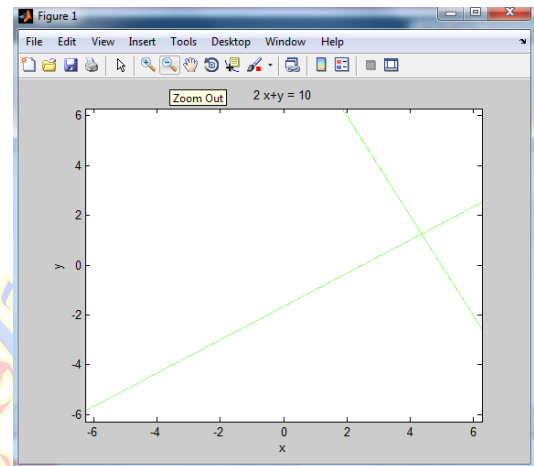
```
ezplot(a)
```

```
hold on
```

```
ezplot(b)
```

```
hold off
```

```
axes[6 10 6 10]
```



```
Desktop >
Command Window
New to MATLAB? Watch this Video, see Examples, or read Getting Started.
x =
35/8
y =
5/4
fx >> |
```

Assignments

Find the intersection point and solution for following equations.

1. $a = '9x+7y=30'$ and $'20x^2+4y^2=6'$
2. $e = '9x^2+2x+4=10'$
3. $f = '10x^3+20x^3+10x+10=70'$
4. $g = '70x^4+80x^3+20x^2+10x+10=70'$

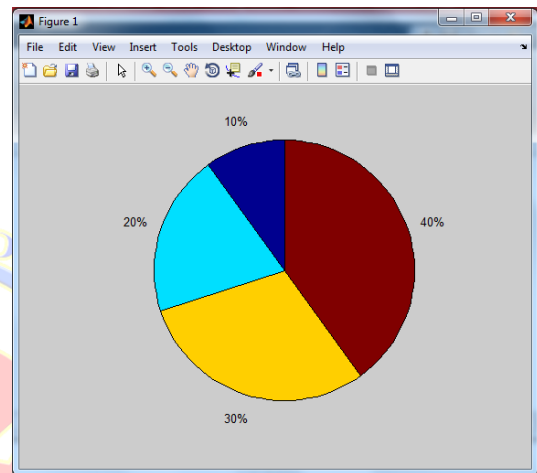
CHAPTER 5 PIECHART

Pie chart is the representation of data in terms of pie and its sectors.

5.1 Create a pie chart of the entries 10, 20, 30, 40.

Command >>

```
pie([10 20 30 40])
```



5.1 Create a pie chart of the entries 90, 90, 90, 90 with their name as Villupuram, Pondy, Cuddalore, Thanjavur.

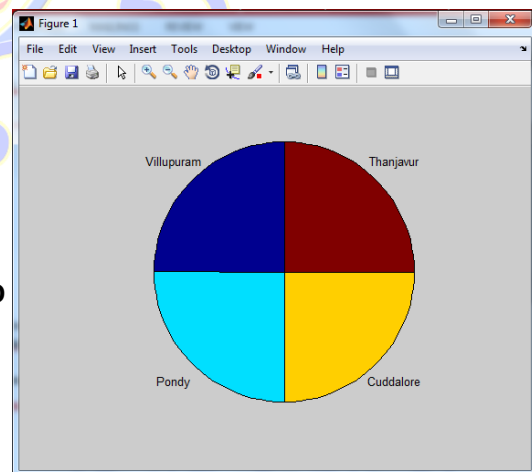
Command >>

```
pie([90 90 90 90],{'Villupuram','Pondy','Cuddalore','Thanjavur'})
```

Assignments

Make the pie chart for these

1. Entries = 1, 2, 7, 8, 9
2. Entries = 11, 52, 77, 28 with names A, B, C, D



CHAPTER 6

DIFFERENTIATION – INTERGRATION

1. Differentiate x^3+90 wrt x .

Solution

Step 1: Assign the variables

```
>>syms x % symbolic variables
```

Step 2: Write the function

```
>> a= x^3+90 % function
```

Step 3: Use the differentiation command

```
>>b = diff(a,x)
```

Ans : $3x^2$

Step 4: If more simplified results are needed

```
>>c=pretty(b)
```

Ans : $3x^2$

1. Differentiate $x^2+2xy+y^2+90$ wrt y , 2 times

Solution

```
syms x y
```

```
a= x^2+2*x*y+y^2+90; % function
```

```
b=diff(a,y,2)
```

Ans : 2

Assignments

1. Differentiate $f = e^{-ax}x^{3b}\sin(cxy)$ with respect to x 2 times.
2. Differentiate $f = \sin(x)+2*\cos(x)$ with respect to x 20 times.

1. Integrate x^3+90 wrt x .

Solution

Step 1: Assign the variables

```
>>syms x % symbolic variables
```

Step 2: Write the function

```
>> a= x^3+90 % function
```

Step 3: Use the differentiation command

```
>>b = int(a,x)
```

Ans : $(x*(x^3 + 360))/4$

Step 4: If more simplified results are needed

```
>>c=pretty(b)
```

$$\frac{x^3 (x^3 + 360)}{4}$$

Ans :.

Assignments

1. Integrate $f = e^{-ax}x^{3b}\sin(cxy)$ with respect to x .
2. Differentiate $f = \sin(x)+2*\cos(x)$ with respect to x .

CHAPTER 7

DIFFERENTIAL EQUATION

1st order differential equation

Question: Solve the first order differential equation

$$dy/dx+2y=12\sin(4x),y(0)=10$$

```
syms y(x)
a=diff(y,1)+2*y==12*sin(4*x);
b=y(0)==10;
display('Result of dy/dx+2y=12sin(4x),y(0)=10')
c=dsolve(a,b)
```

Result

Result of $dy/dx+2y=12\sin(4x),y(0)=10$

$$c = (62 \cdot \exp(-2 \cdot x))/5 - (12 \cdot \cos(4 \cdot x))/5 + (6 \cdot \sin(4 \cdot x))/5$$

1st order differential equation with its graph and plot

Question: Solve the first order differential equation

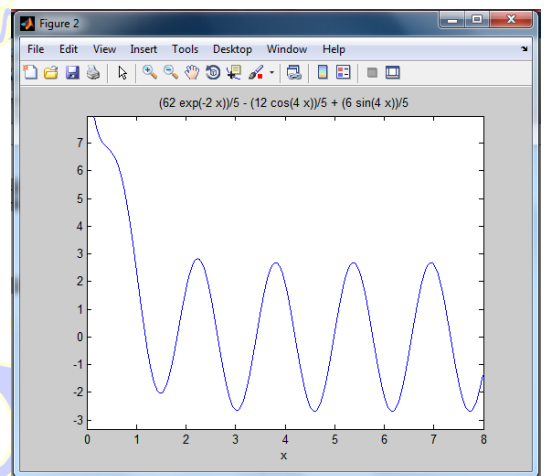
$$dy/dx+2y=12\sin(4x),y(0)=10$$

```
syms y(x)
a=diff(y,1)+2*y==12*sin(4*x);
b=y(0)==10;
display('1. Result of dy/dx+2y=12sin(4x),y(0)=10')
c=dsolve(a,b)
%graph
figure
ezplot(c,[0 8])
```

Result

Result of $dy/dx+2y=12\sin(4x),y(0)=10$

$$c = (62 \cdot \exp(-2 \cdot x))/5 - (12 \cdot \cos(4 \cdot x))/5 + (6 \cdot \sin(4 \cdot x))/5$$

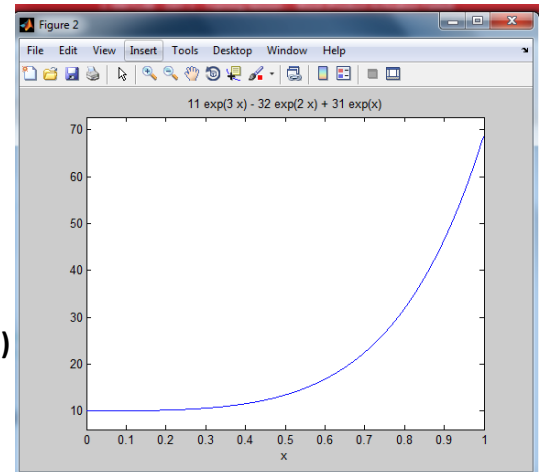


3rd order differential equation

Question: Solve the third order differential equation

$$d^3y/dt^3 - 6.d^2y/dt^2 + 11.dy/dt - 6y = 0, y(0)=10, y'(0)=0, y''(0)=2$$

```
syms y(x)
dy=diff(y);
d2y=diff(y,2);
a=diff(y,3)-6*diff(y,2)+11*diff(y)-6*y==0;
b=y(0)==10;
c=dy(0)==0;
d=d2y(0)==2;
display('2. Result of d3y/dt3-6.d2y/dt2+11.dy/dt-6y=0,y(0)=10')
e=dsolve(a,b,c,d)
%graph
figure
ezplot(e,[0 1])
axis([0 1 0 8])
```



Result

Result of $d^3y/dt^3 - 6.d^2y/dt^2 + 11.dy/dt - 6y = 0, y(0)=10$

e =

$$11 \cdot \exp(3 \cdot x) - 32 \cdot \exp(2 \cdot x) + 31 \cdot \exp(x)$$

