PLOTTING OF CURVES AND SURFACES

Mathematical form:

- Visualizing curves and surfaces
- Draw the curve for the given function f(x)
- Draw the surface for the given function.

Example 1:
Draw the surface by using plot3
MATLAB Code:

```
t=linspace(0,2*pi,500);
x=cos(t);
y=sin(t);
z=sin(5*t);
comet3(x,y,z)
plot3(x,y,z,'g*','markersize',7)
xlabel('x-axis')
ylabel('y-axis')
zlabel('z-axis')
title('3D Curve')
```

Example 2:

Draw the surface by using ezsurf and ezplot

MATLAB Code:

```
syms x y
f = 2*(x^2+y^2)
ezsurf(f)
colormap cool
```

Example 3:

Draw the ezplot for the function x^2+2*x-6

MATLAB Code:

```
syms x
y = x^2+2*x-6
ezplot(y)
```

Example 4:

MATLAB Code:

```
x=-1:.05:1;
y=-1:.05:1;
[x,y]=meshgrid(x,y);
z=x.*y.^2-x.^3
surf(x,y,z);
colormap spring
shading interp
```

Applications of Derivatives

AIM

To find the equation of tangent and visualize it.

MATLAB Syntax used

Syntax	
diff(f)	Differentiate the function with respect to x symbolically
solve(eq)	The input to solve can be either symbolic expressions or strings. If eq is a symbolic expression (x^2 - 2*x + 1) or a string that does not contain an equal sign ('x^2 - 2*x + 1'), then solve(eq) solves the equation eq = 0 for its default variable (as determined by symvar).
R = subs(S, old, new)	Replaces old with new in the symbolic expression S.

MATLAB Code

```
syms x                                  % Declaring a symbolic variable
y=input ('enter the function f in terms of x:')
x1 = input('Enter x value at which tangent  : ');
ezplot(y,[x1-2 x1+2])                   % Easy Plotting
hold on
y_derivative = diff(y,x); % Differentiation in MATLAB
slope = subs(y_derivative,x,x1);  % Finding the slope  at the given point
y1 = subs(y,x,x1);  % Finding the value of the function at the given point
plot(x1,y1,'r:*')
Tgt_line = slope*(x-x1)+y1 % Tangent Line Equation at the given
                                point
h = ezplot(Tgt_line,[x1-2 x1+2]);    % Plotting the Tangent Line
set(h,'color','r')  % Coloring the Tangent Line
hold off
```

Examples

1) Find the equation of tangent to the curve $y = 4 - x^2$ at (-1,3).

Practice Problems

1) Find the equation of tangent to the curve $y = 2\sqrt{x}$ at (1,2).

2) Find the equation of tangent to the curve $y = x^3$ at (-2,-8).