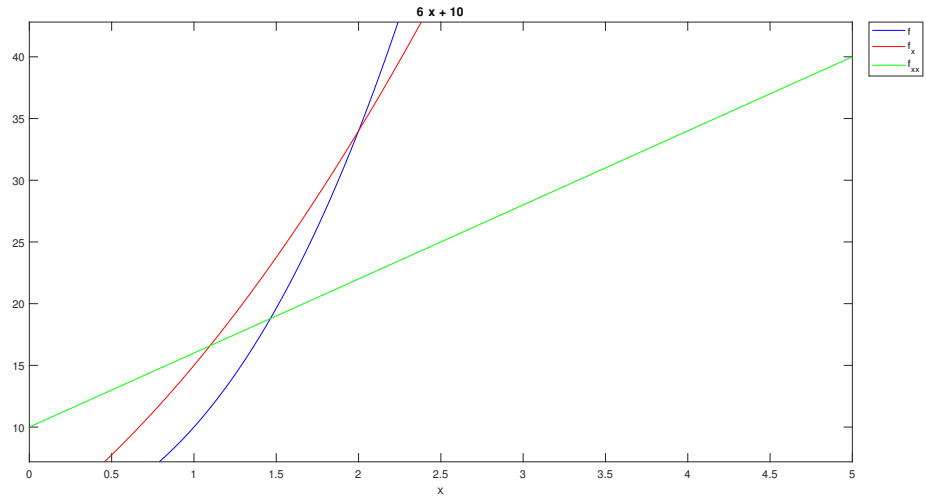
Week 3

(1) **To Plot the function and its derivatives**

Matlab Code

```
clc
clear all
syms x real
f= input('Enter the function f(x):');
fx= diff(f,x)
fxx= diff(fx,x)
D = [0, 5];
l=ezplot(f,D)
set(l,'color','b');
hold on
h=ezplot(fx,D);
set(h,'color','r');
e=ezplot(fxx,D);
set(e,'color','g');
legend('f','$f_x$','$f_{xx}$')
legend('Location','northeastoutside')
```

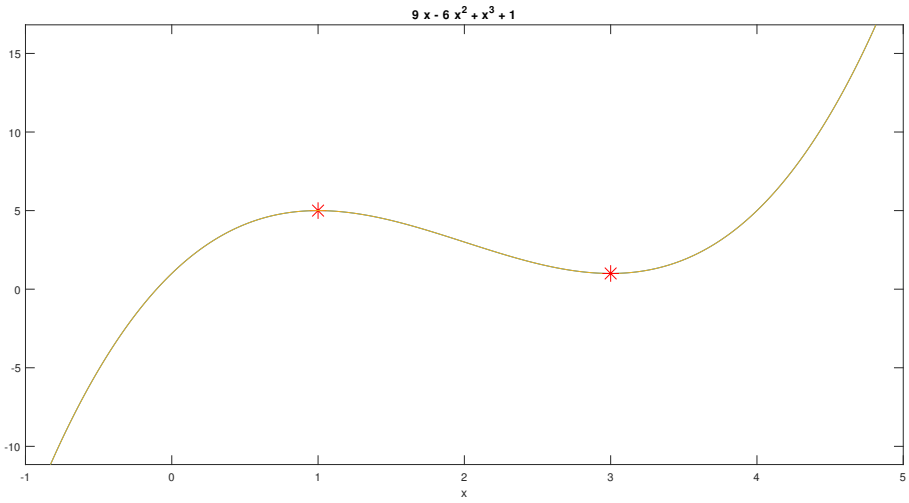
Sample Output



(2) **To find the maxima and minima of the single variable function and visualize it.**

Matlab Code

```
clc
clear all
syms x real
f= input('Enter the function f(x):');
fx= diff(f,x);
fxx= diff(fx,x);
c = solve(fx)
c=double(c);
for i = 1:length(c)
T1 = subs(fxx, x ,c(i) );
T1=double(T1);
T3= subs(f, x, c(i));
T3=double(T3);
if (T1==0)
sprintf('The inflection point is x = %d',c(i))
else
if (T1 < 0)
sprintf('The maximum point x is %d', c(i))
sprintf('The maximum value of the function is %d', T3)
else
sprintf('The minimum point x is %d', c(i))
sprintf('The minimum value of the function is %d', T3)
end
end
cmin = min(c);
cmax = max(c);
D = [cmin-2, cmax+2];
ezplot(f,D)
hold on
plot(c(i), T3, 'g*', 'markersize', 15);
end
```

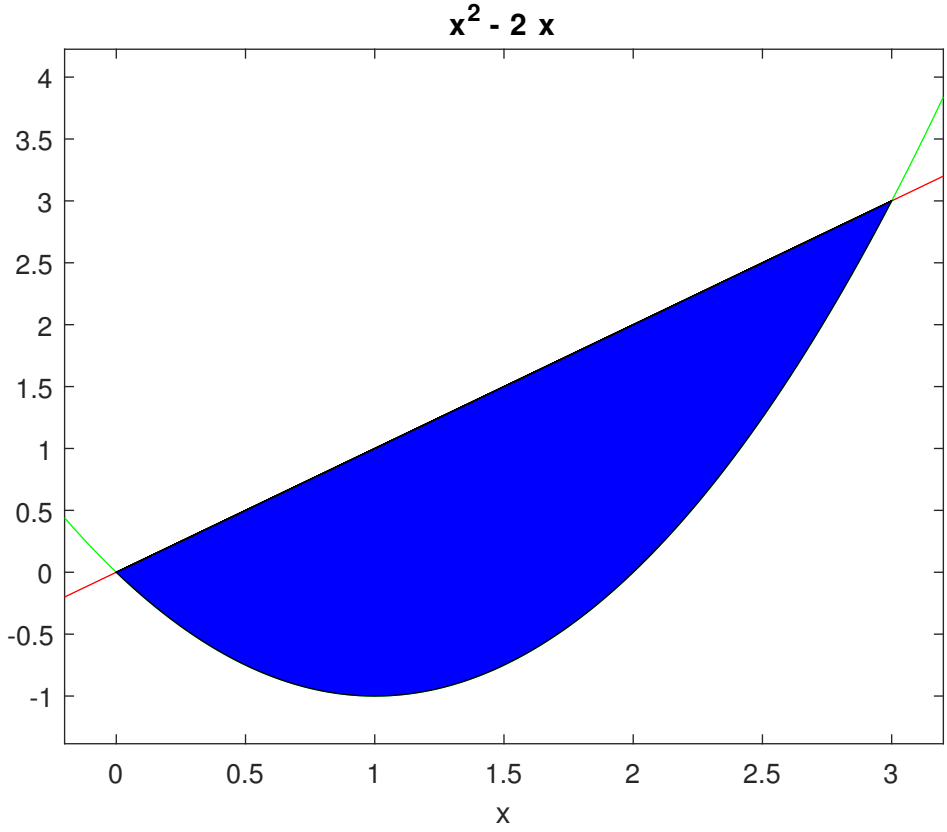

9 x - 6 x^2 + x^3 + 1
15
10
5
0
-5
-10
-1
0
1
2
3
4
5
x

Definite Integrals and its applications

(3) **To find the area of the regions enclosed by curves and visualize it.**

Matlab Code

```
clc
clear
syms x
y1=input('ENTER the upper curve as a function of x : ');
y2=input('ENTER the lower curve as a function of x : ');
t=solve(y1-y2);
t=double(t);
A=int(y1-y2,t(1),t(2))
D=[t(1)-0.2 t(2)+0.2];
ez1=ezplot(y1,D);
set(ez1,'color','r')
hold on
ez2=ezplot(y2,D);
set(ez2,'color','g')
xv = linspace(t(1),t(2));
y1v =subs(y1,x,xv);
y2v = subs(y2,x,xv);
x = [xv,xv];
y = [y1v,y2v];
fill(x,y,'b')
```


x^2 - 2 x
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
0
0.5
1
1.5
2
2.5
3
x

Practice Problems

(a) Find the maximum and minimum of $f(x) = x^3 - 6x^2 + 9x + 1$ on the interval $[0, 5]$.

(b) Find the maximum and minimum of $f(x) = x^3 + 3x^2 + 4x + 5$.

(c) Find the area of the regions enclosed by the curves $y = -x^2 + 4x$, $y = x^2$.

(d) Find the area of the regions enclosed by curves $y = 7 - 2x^2$ and $y = x^2 + 4$.