```
% Class 9: LAGRANGE'S MULTIPLIERS METHOD

clc
clear all
syms x y lam real

f= input('Enter the function to be maximized in terms of x and y:');
g= input('Enter the constrant function in terms of x and y:');

[alam,ax,ay]= solve(jacobian(f-lam*g,[x y lam]));
T = subs(subs(f,x,ax),y,ay);
for i = 1:1:size(T)
    figure
    sprintf('The point(x,y) is (%d,%d)',double(ax(i)),double(ay(i)))
    sprintf('The value of the function is %d',double(T(i)))
    [X1,Y1]= meshgrid(double(ax(i))-3 : 0.2 : double(ax(i))+3,double(ay(i))-
3 : 0.2 : double(ay(i))+3);
    zfun = @(x, y) eval(vectorize(f));
    Z1=zfun(X1,Y1);
    contour(X1,Y1,Z1,70)
    hold on
    h = ezplot(g,[double(ax(i))-3,double(ax(i))+3]);
    set(h,'Color',[1,0.7,0.9])
    plot(double(ax(i)),double(ay(i)),'r.','markersize',12)
end
```

**P.T.O**

**OUTPUT WINDOW:**

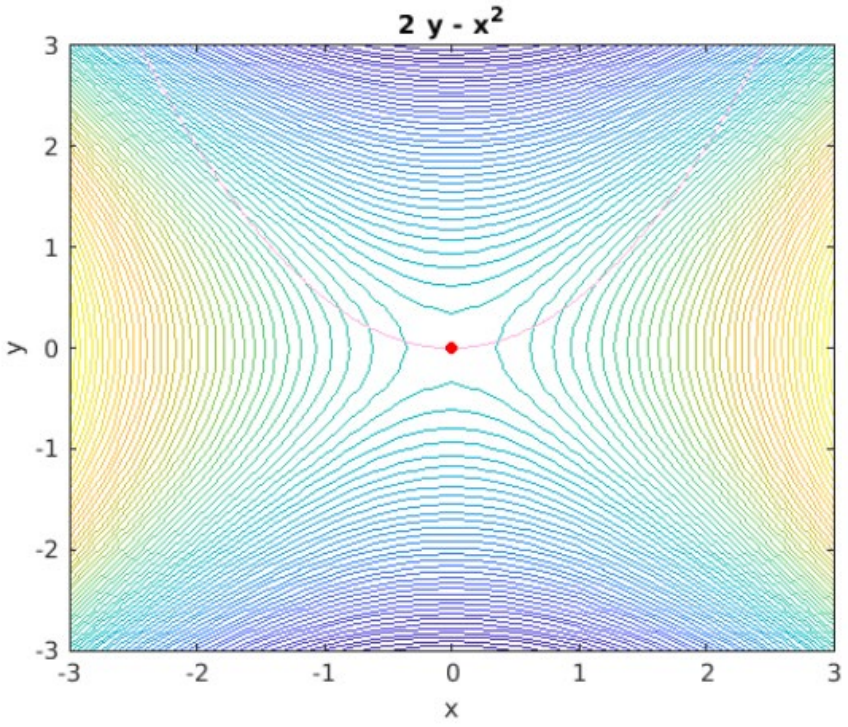
1. Find the extreme values of the function f(x,y)=x^2-y^2 subject to the constraints 2y-x^2=0

```
Enter the function to be maximized in terms of x and y:
x^2-y^2
Enter the constrant function in terms of x and y:
2*y-x^2
>>
```

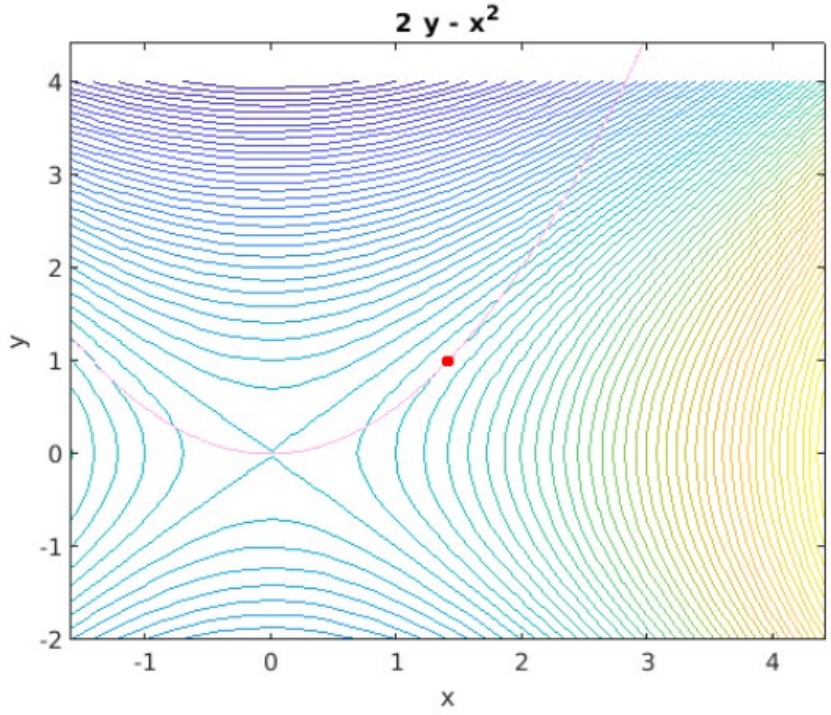
```
T =
```

$$\begin{pmatrix} 0 \\ -1 \\ -1 \\ 2 \\ 1 \\ 1 \\ 2 \\ 1 \\ 1 \end{pmatrix}$$

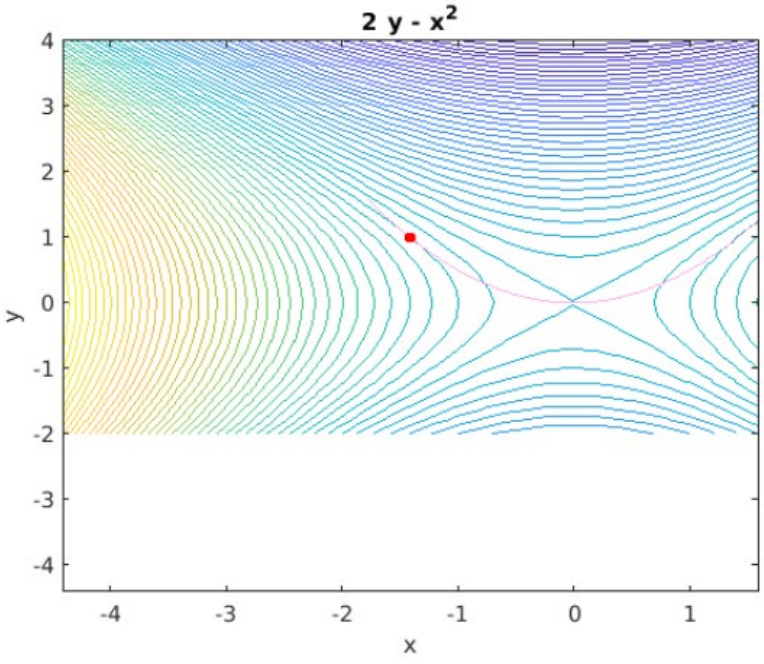
```
ans = 'The point(x,y) is (0,0)'
ans = 'The value of the function is 0'
```



```
ans = 'The point(x,y) is (1.414214e+00,1)'
ans = 'The value of the function is -1'
```




```
ans = 'The point(x,y) is (-1.414214e+00,1)'
ans = 'The value of the function is -1'
```

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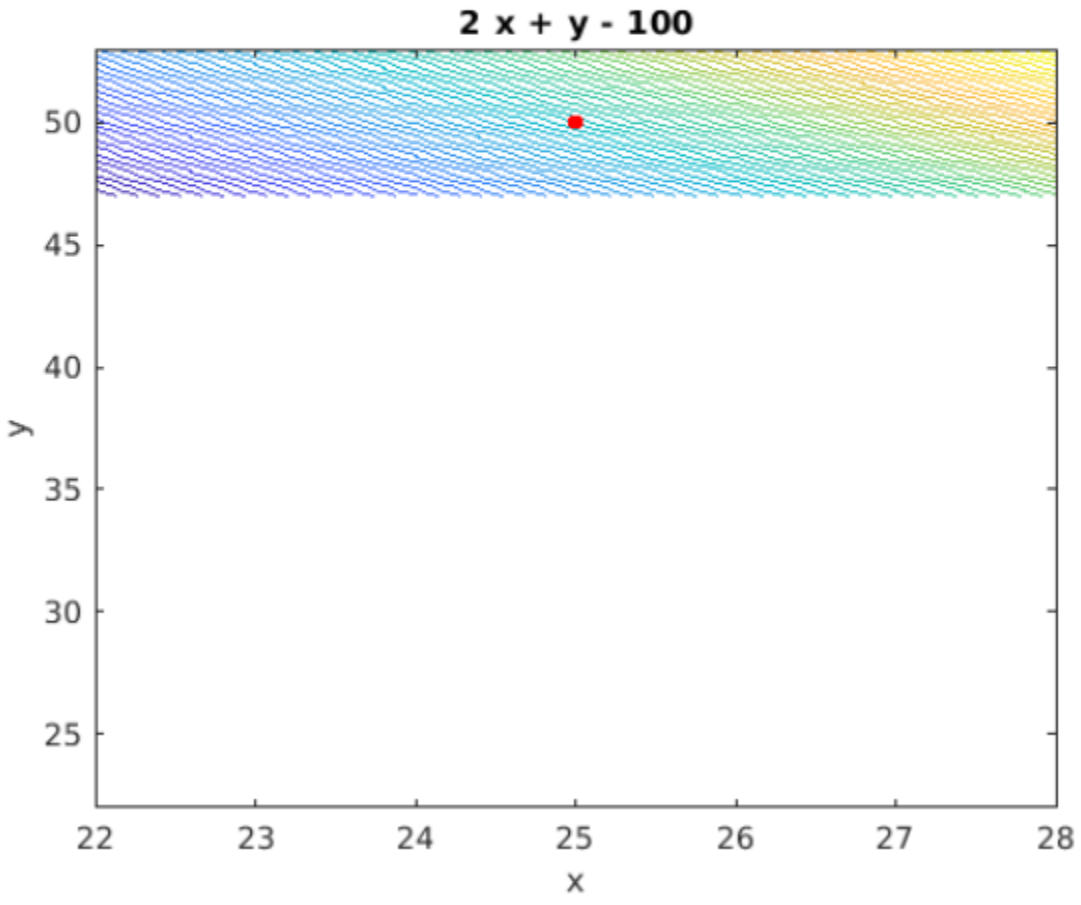
2. Find the extreme values of the function f(x,y)=2x+2xy+y subject to the constraints 2x+y=100

```
Enter the function to be maximized in terms of x and y:
2*x+2*x*y+y
Enter the constrant function in terms of x and y:
2*x+y-100
>>
```

```
T = 2600
```

```
ans = 'The point(x,y) is (25,50)'
ans = 'The value of the function is 2600'
```



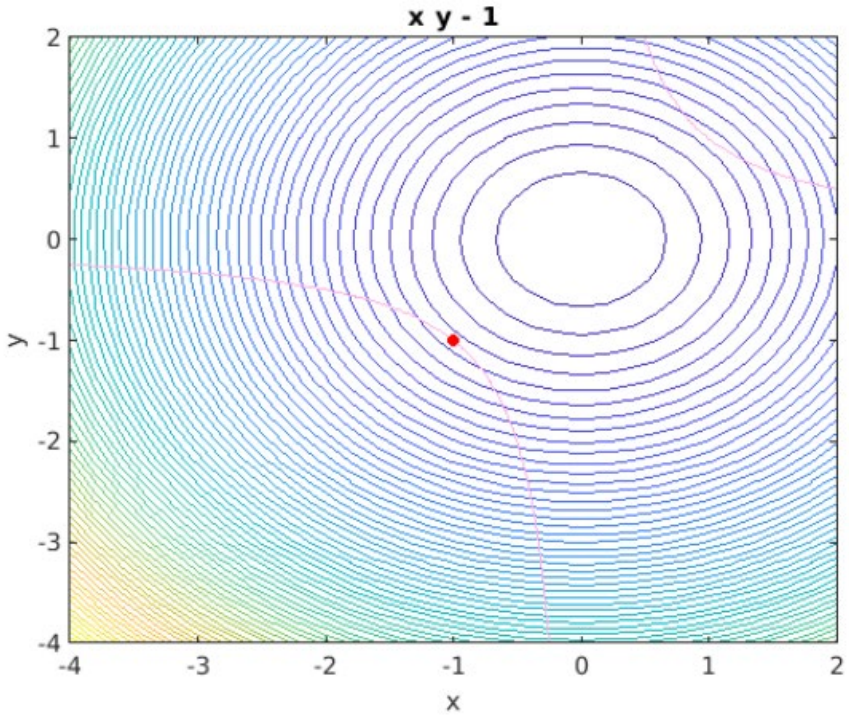
3. Find the extreme values of the function f(x,y)=x^2+y^2 subject to xy=1

```
Enter the function to be maximized in terms of x and y:
x^2+y^2
Enter the constrant function in terms of x and y:
x*y-1
>>
```

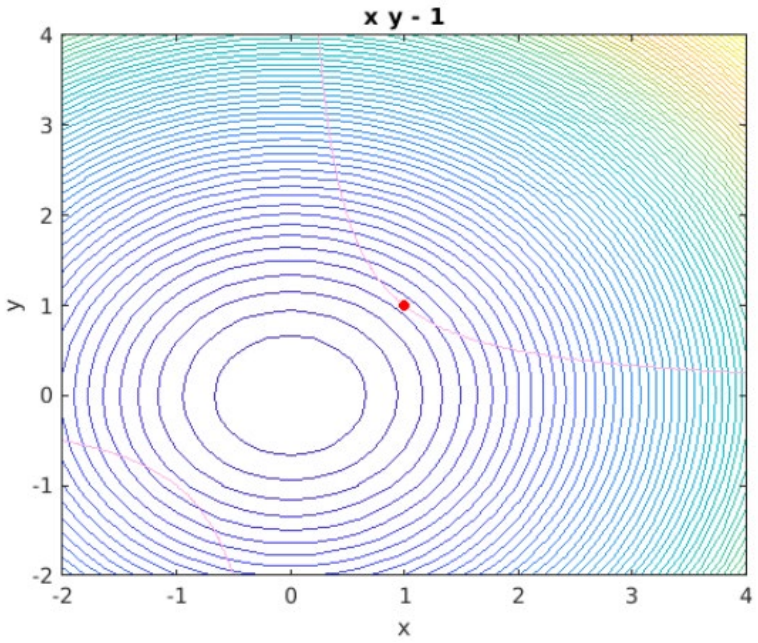
```
T =
```

$$\begin{pmatrix} 2 \\ 2 \\ 2 \\ 2 \end{pmatrix}$$

```
ans = 'The point(x,y) is (-1,-1)'
ans = 'The value of the function is 2'
```



```
ans = 'The point(x,y) is (1,1)'
ans = 'The value of the function is 2'
```




4. Find the extreme values of the function f(x,y)=4x+6y subject to x^2+y^2=1

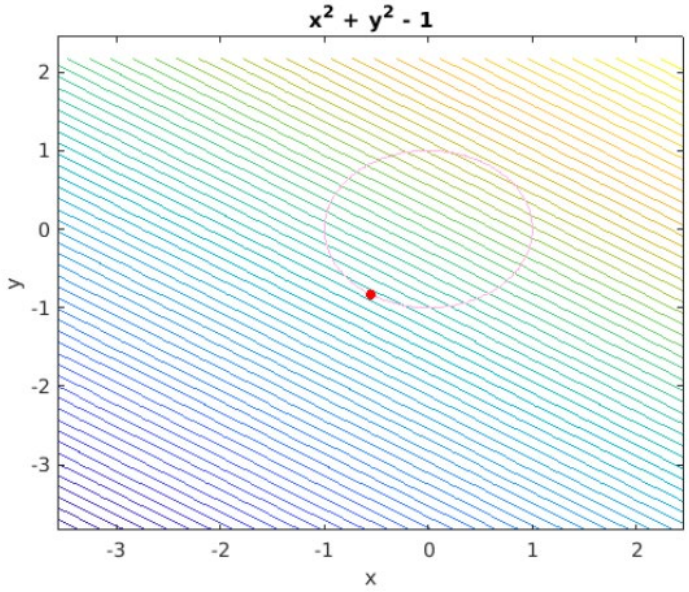
```
Enter the function to be maximized in terms of x and y:
4*x+6*y
Enter the constrant function in terms of x and y:
x^2+y^2-1
>>
```

T =

$$\begin{pmatrix} -2\sqrt{13} \\ \frac{10\sqrt{13}}{13} \\ -\frac{10\sqrt{13}}{13} \\ 2\sqrt{13} \end{pmatrix}$$

ans = 'The point(x,y) is (-5.547002e-01,-8.320503e-01)'

ans = 'The value of the function is -7.211103e+00'




ans = 'The point(x,y) is (5.547002e-01,8.320503e-01)'

ans = 'The value of the function is 2.773501e+00'