FALL SEM 2019-20

MATLAB-MAT1011(CFE)-ELA

DIGITAL ASSIGNMENT-3

SLOT: L31+L32

REGISTRATION NUMBER:19BCE0811

NAME: Akshat Srivastav

EXERCISE 1:

Sketch the graphs of the following functions. Also, determine and plot the points of their local maximum, local minimum or saddle points.

Code for the problem:

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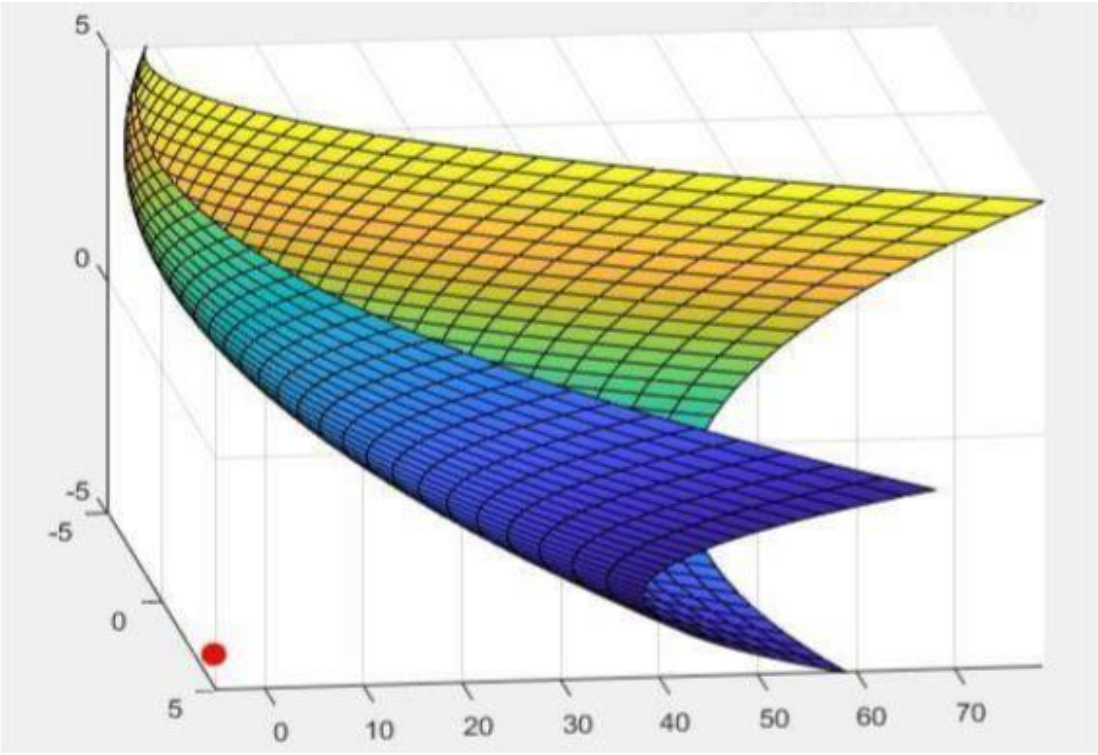
```
syms x y real
f=input('Enter the function f(x,y)= ')
fsurf(f,x,y)
hold on
fx=diff(f,x)
fy=diff(f,y)
[xc,yc]=solve(fx,fy,x,y)
disp('Critical points are ')
p=[xc,yc]
fxx=diff(fx,x)
fyy=diff(fy,y)
fxy=diff(fy,x)
D=fxx*fyy-fxy^2
a=numel(xc)
for i=1:a
    p=subs(D,{x,y},{xc(i),yc(i)})
    q=subs(fxx,{x,y},{xc(i),yc(i)})
    if p>0
        if q>0
            disp('Point of Minima is')
            Q=[xc(i),yc(i)]
            disp('Minimum value of f is')
            fmin=subs(f,{x,y},{xc(i),yc(i)})
            plot3(xc(i),yc(i),fmin,'.r','MarkerSize',30)
        elseif q<0
            disp('Point of Maxima is')
            R=[xc(i),yc(i)]
            disp('Maximum value of f is')
            fmax=subs(f,{x,y},{xc(i),yc(i)})
            plot3(xc(i),yc(i),fmax,'.r','MarkerSize',30)
        end
    elseif p==0
        disp('Further study needed')
    else
        disp('Saddle point of f is')
        S=[xc(i),yc(i)]
        fv=subs(f,{x,y},{xc(i),yc(i)})
        plot3(xc(i),yc(i),fv,'.g','MarkerSize',30)
    end
end
```

a)f(x,y)=x^2+xy+y^2+3x-3y

GRAPH OF THE FUNCTION:

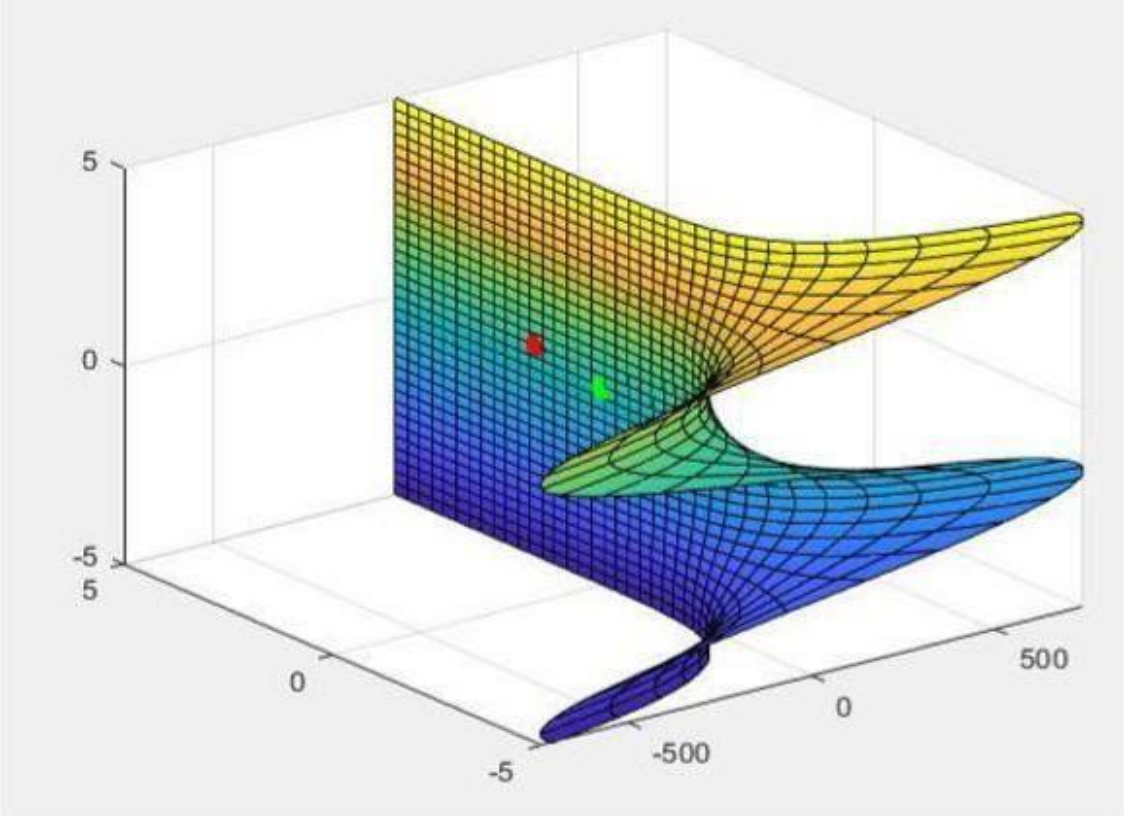


OUTPUT:

```
Point of Minima is

Q =

[ -3, 3]

Minimum value of f is

fmin =

-5
```

b)f(x,y)=x*exp(-x)*sin(y)

GRAPH OF THE FUNCTION:

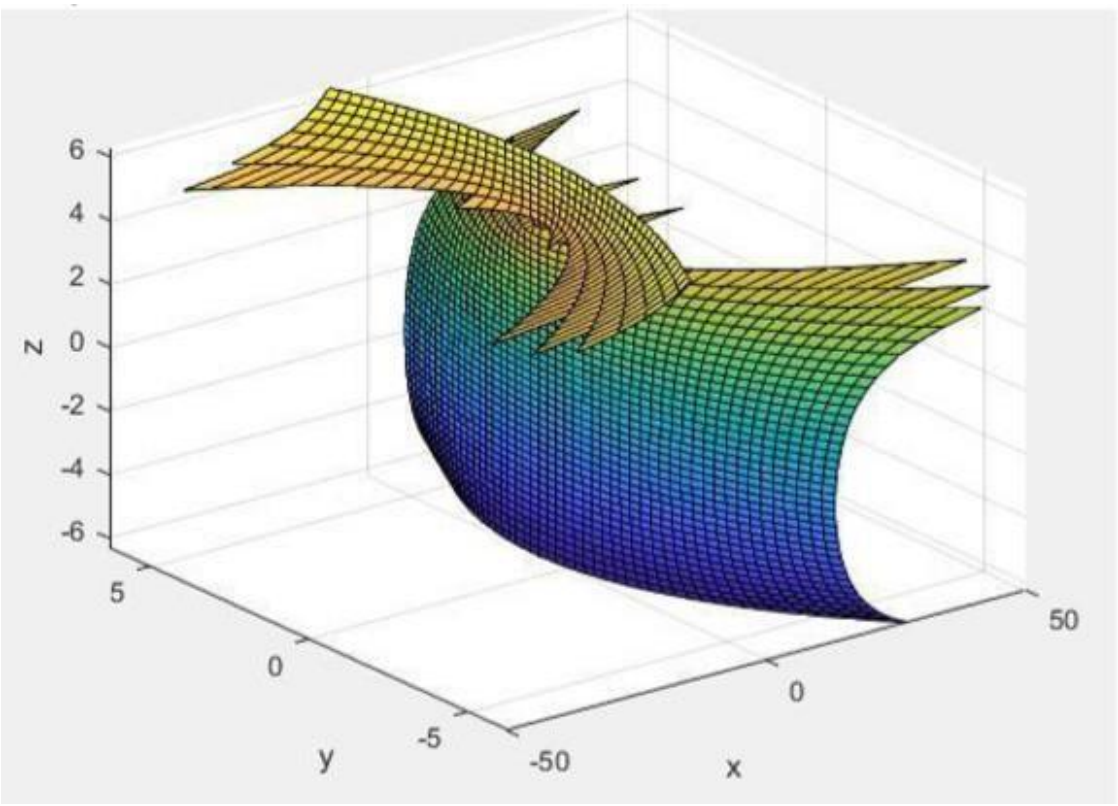


OUTPUT:

```
Point of Maxima is

R =

[ 1, pi/2]

Maximum value of f is

fmax =

exp(-1)
```

c)f(x,y)=9*(x-1)^2/(36-(y+2)^2)

GRAPH OF THE FUNCTION:

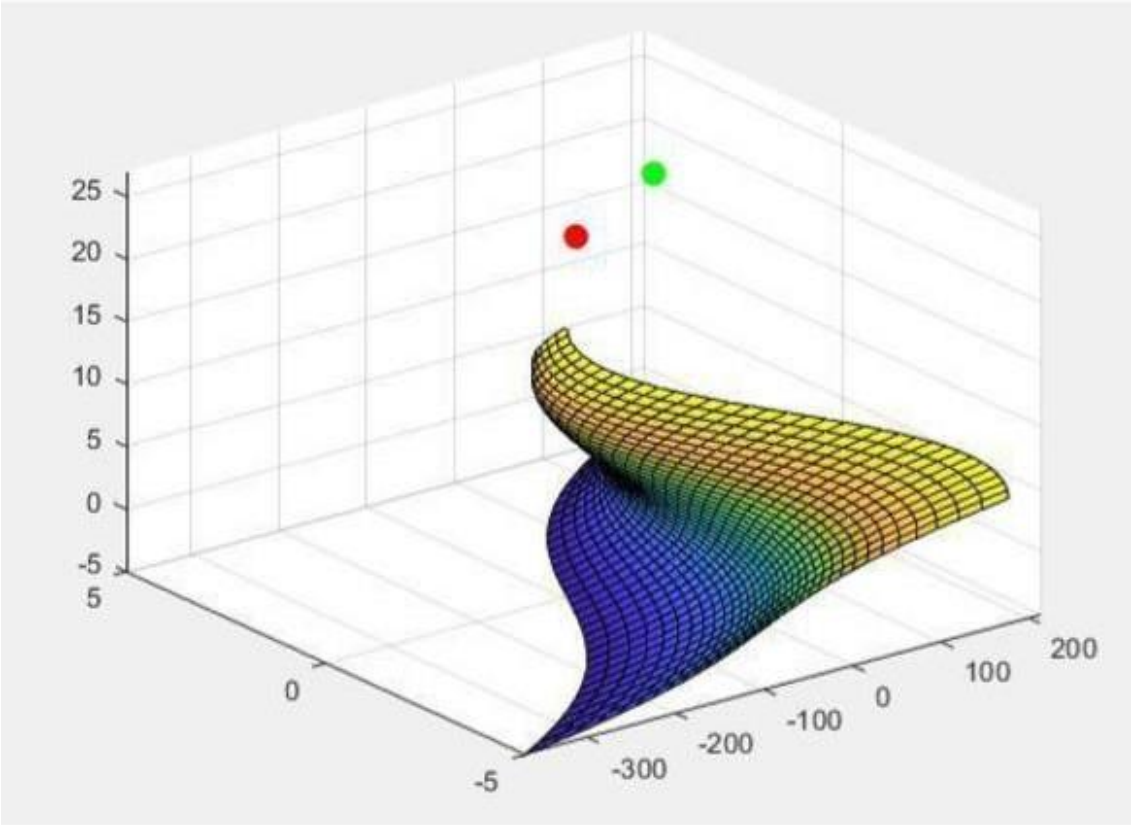


OUTPUT:

```
p =

0


q =

9/16

Further study needed
```

d)f(x,y)=x^3+y^3-6*x*y+27

GRAPH OF THE FUNCTION:

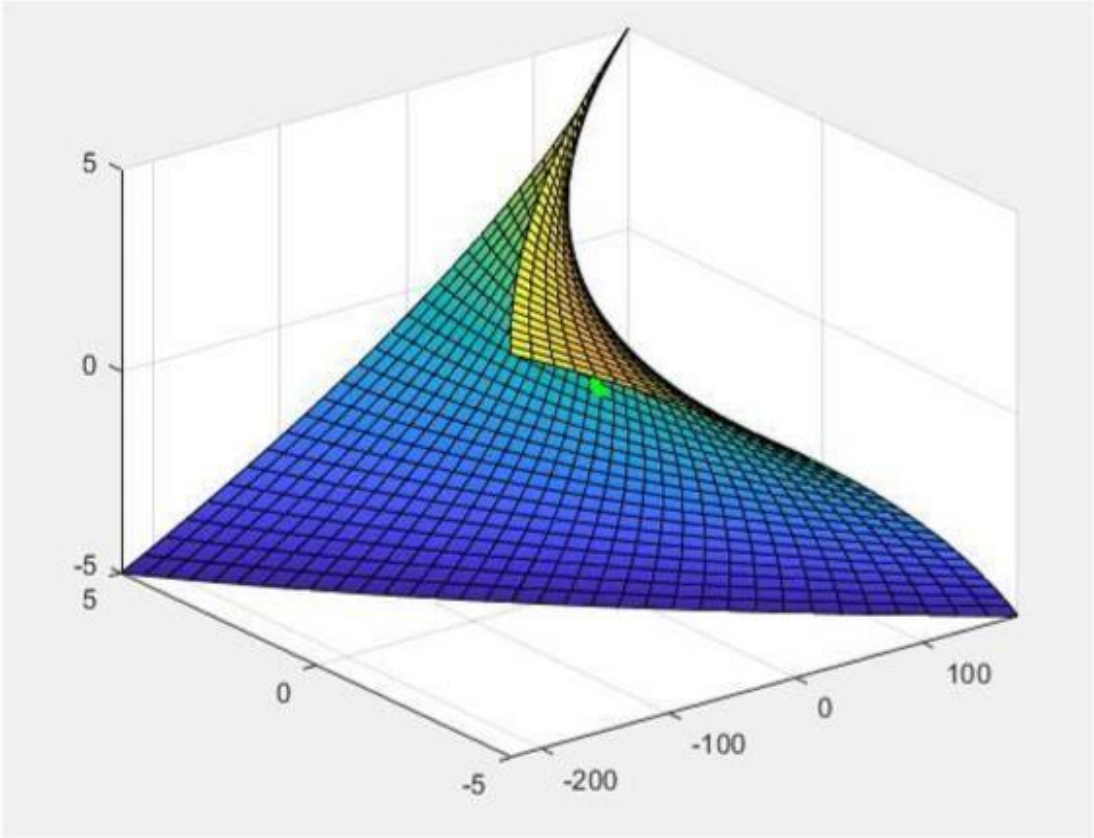


OUTPUT:

```
Point of Minima is

Q =

[ 2, 2]

Minimum value of f is

fmin =

19
```

e)f(x,y)= s^2-2*y^2+8*x*y

GRAPH OF THE FUNCTION:



OUTPUT:

```
Saddle point of f is

S =

[ 0, 0]


fv =

0
```