```
%EXTREMUM OF THE FUNCTIONS IN TWO VARIABLES
syms x y
f=10*x*y*exp(-(x^2+y^2));
dfx=diff(f,x);
dfy=diff(f,y);
[m,n]=solve(dfx,dfy);
m=double(m);
n=double(n);
a=diff(dfx,x);
b=diff(dfy,y);
c=diff(dfx,y);
D=a*b-c^2;
for i=1:size(m)
    p=subs(D,[x,y],[m(i),n(i)]);
    q=subs(D,[x,y],[m(i),n(i)]);
    r=subs(f,[x,y],[m(i),n(i)]);
    if (double(p)<0)
        fprintf('There is a saddle point at (x,y) is (%f,%f)',m(i),n(i))
    elseif (double(p)==0)
        fprintf('The point (%f,%f) has inconclusion.',m(i),n(i))
    else
        if (double(q)>0)
            fprintf('\nThe maximum value occurs at point (%f,%f)',m(i),n(i))
            fprintf('And the maximum value of the function is %f',r)
        else
            fprintf('\nThe minimum value occurs at point (%f,%f)',m(i),n(i))
            fprintf('And the minimum value of the function is %f',r)
        end
    end
end
```

```
There is a saddle point at (x,y) is (0.000000,0.000000)
The maximum value occurs at point (-0.707107,-0.707107)And the maximum value
of the function is 1.839397
The maximum value occurs at point (0.707107,-0.707107)And the maximum value
of the function is -1.839397
The maximum value occurs at point (-0.707107,0.707107)And the maximum value
of the function is -1.839397
The maximum value occurs at point (0.707107,0.707107)And the maximum value of
the function is 1.839397
```

```
%EXTREMUM OF THE FUNCTIONS IN TWO VARIABLES
syms x y
f=108*x*y-2*x^2*y-2*x*y^2;
dfx=diff(f,x);
dfy=diff(f,y);
[m,n]=solve(dfx,dfy);
m=double(m);
n=double(n);
a=diff(dfx,x);
b=diff(dfy,y);
c=diff(dfx,y);
D=a*b-c^2;
for i=1:size(m)
    p=subs(D,[x,y],[m(i),n(i)]);
    q=subs(D,[x,y],[m(i),n(i)]);
    r=subs(f,[x,y],[m(i),n(i)]);
    if (double(p)<0)
        fprintf('\nThere is a saddle point at (x,y) is (%f,%f)',m(i),n(i))
    elseif (double(p)==0)
        fprintf('\nThe point (%f,%f) has inconclusion.',m(i),n(i))
    else
        if (double(q)<0)
            fprintf('\nThe maximum value occurs at point (%f,%f)',m(i),n(i))
            fprintf('And the maximum value of the function is %f',r)
        else
```

```
            fprintf('\nThe minimum value occurs at point (%f,%f)',m(i),n(i))
            fprintf('And the minimum value of the function is %f',r)
            h=((108-5*m(i)-4*n(i))/4);
            fprintf('%f',h)
        end
    end
end
```

```
There is a saddle point at (x,y) is (0.000000,0.000000)
The minimum value occurs at point (18.000000,18.000000)And the minimum value
of the function is 11664.000000-13.500000
There is a saddle point at (x,y) is (54.000000,0.000000)
There is a saddle point at (x,y) is (0.000000,54.000000)
```

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