
```
syms x y
f=108*x*y-2*x^2*y-2*x*y^2;
p=diff(f,x); q=diff(f,y);
[ax,ay]=solve(p,q);
ax=double(ax);
ay=double(ay);
r=diff(p,x);
s=diff(p,y);
t=diff(q,y);
D=r*t-s^2;
for i=1:size(ax)
    T1=subs(D,[x y], [ax(i), ay(i)]);
    T2=subs(r,[x y], [ax(i), ay(i)]);
    T3=subs(f,[x y], [ax(i), ay(i)]);
    if (double(T2)<0)
        sprintf('The dimensions of an acceptable box of largest volume is
(%f, %f)',ax(i),ay(i))
        sprintf('and the maximum volume is %f',T3)
    end
end
```

```
ans =
```

```
    'The dimensions of an acceptable box of largest volume is (18.000000,
18.000000)'
```

```
ans =
```

```
    'and the maximum volume is 11664.000000'
```

```
ans =
```

```
    'The dimensions of an acceptable box of largest volume is (0.000000,
54.000000)'
```

```
ans =
```

```
    'and the maximum volume is 0.000000'
```

```
syms x y
f=10*x*y*exp(-x^2-y^2);
p=diff(f,x); q=diff(f,y);
[ax,ay]=solve(p,q);
ax=double(ax);
ay=double(ay);
r=diff(p,x);
s=diff(p,y);
t=diff(q,y);
D=r*t-s^2;
for i=1:size(ax)
    T1=subs(D,[x y], [ax(i), ay(i)]);
    T2=subs(r,[x y], [ax(i), ay(i)]);
    T3=subs(f,[x y], [ax(i), ay(i)]);
    if (double(T1)<0)
        sprintf('The point (%f,%f) is a saddle point',ax(i),ay(i))
    else
        if (double(T2)<0)
            sprintf('The maximum value at (x, y) is (%f, %f)',ax(i),ay(i))
            sprintf('and the maximum value of f(x) is %f',T3)
        else
            sprintf('The minimum value at (x, y) is (%f, %f)',ax(i),ay(i))
            sprintf('and the minimum value of f(x) is %f',T3)
        end
    end
end
```

```
end
end

ans =

    'The point (0.000000,0.000000) is a saddle point'

ans =

    'The maximum value at (x, y) is (-0.707107, -0.707107)'

ans =

    'and the maximum value of f(x) is 1.839397'

ans =

    'The minimum value at (x, y) is (0.707107, -0.707107)'

ans =

    'and the minimum value of f(x) is -1.839397'

ans =

    'The minimum value at (x, y) is (-0.707107, 0.707107)'

ans =

    'and the minimum value of f(x) is -1.839397'

ans =

    'The maximum value at (x, y) is (0.707107, 0.707107)'

ans =

    'and the maximum value of f(x) is 1.839397'
```

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