EXPT.NO.3

Title: Finding partial derivatives, Jacobian and plotting the graph.

Suppose f is a function in x and y then it will be expressed by f(x, y). So, the partial derivative of f with respect to x will be ∂f/∂x keeping y as constant.

Jacobian is the determinant of the jacobian matrix. The matrix will contain all partial derivatives of a given function.

Ex-1 : Find the partial derivatives of a function

Program:

```
clear
clc
syms x y
f=x^2+2*y^2-22
P=diff(f,x)
```

Output

f =x^2 + 2*y^2 - 22
P = 2*x

Ex-2 : Find the partial derivatives of a function at point(3,2)

Program:

```
clear
clc
syms x y
f=x^2+2*y^2-22
P=diff (f, x) % Here, I have calculated the (partial) differentiation
of function "f" w.r.t 'x'
Q=subs (P, {x, y},{3,2}) %To know the value of 'P' at certain point
(say x=3, y=2.0)
```

Output:

P = 2*x
Q = 6

For second partial derivatives order derivatives

Ex-3 : Find the second partial derivatives a unction

Program:

```
clear
clc
syms x y
f=x^2+2*y^2-22
P=diff(f,x)
p1=diff(diff(f,x))
```

Output:

P = 2*x

p1 = 2

For mixed partial order derivatives

Ex-4: Find the second partial derivatives a function

Program:

```
clear
clc
syms x y
f=2*x^3 + 2*y^3-18
p2=diff(diff(f,x),y)
```

Output:

f = 2*x^3 + 2*y^3 - 18

p2 =0

Jacobian

Ex-1. Find the Jacobian of function [xyz, y^2 , (x+z)]

Program:

```
clear
clc
syms x y z
A=jacobian ([x*y*z, y^2, x + z], [x, y, z])
det(A)
```

Output:

A =

[y*z, x*z, x*y]

[0, 2*y,   0]

[1,   0,   1]

ans = 2*y^2*z - 2*x*y^2