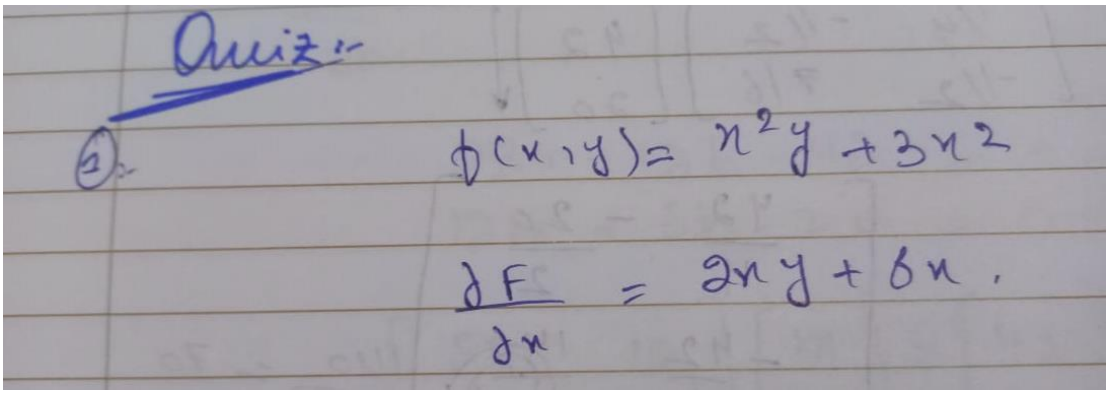
Quiz #1 : Partial Derivatives and Gradients

Question 1

Given the f(x,y)= x^2 y + $3x^2$, find its derivative with respect to x , i.e., find $\partial f/\partial x$



Question 2

Given that $f(x, y) = xy^2 + 2x + 3y$ its gradient, i.e., $\nabla f(x, y)$ is:

a):-

$$\begin{bmatrix} 2xy + 3 \\ y^2 + 2 \end{bmatrix}$$

b):-

$$\begin{bmatrix} 2xy \\ 2x + 3 \end{bmatrix}$$

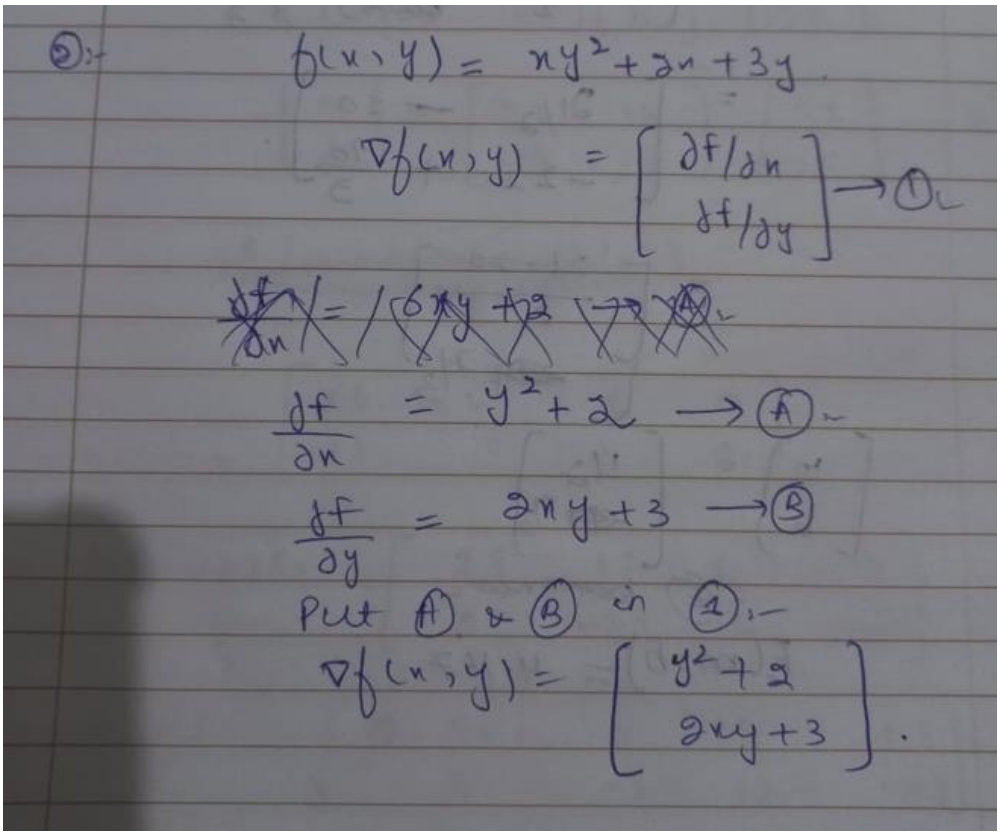
c):-

$$\begin{bmatrix} y^2+2 \\ 2xy+3 \end{bmatrix}$$

d):-

$$\begin{bmatrix} 2y \\ 0 \end{bmatrix}$$

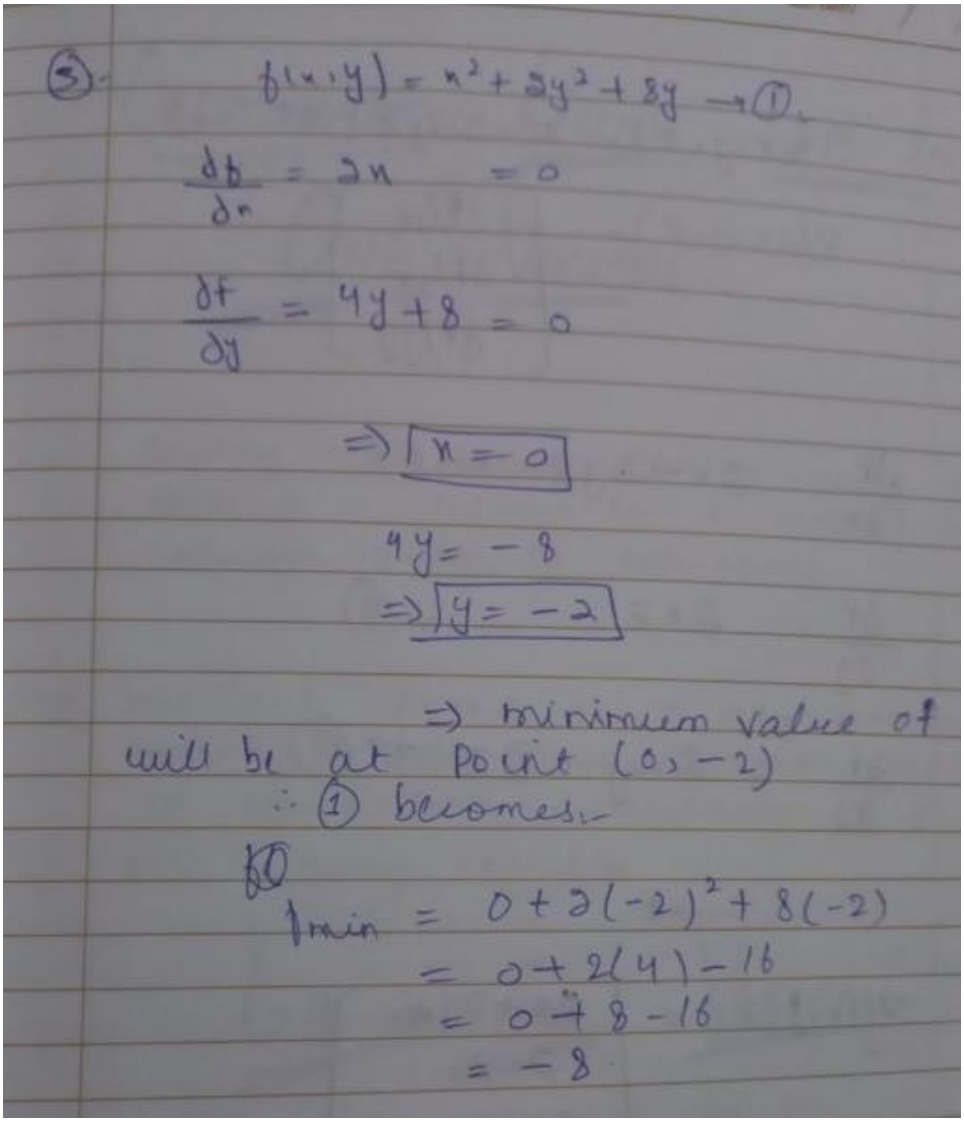
Answer:- c



Question 3

Given the f(x,y)= $x^2 + 2y^2$+ 8y, The minimum value of f is:

Hint: The question asks for the minimum value that the function can output, and not the point (x,y) that gives it.



Question 4

The gradient of f(x,y,z)= $x^2 + z^2 + 2xyz$ is ,

a):-

$$\begin{bmatrix} 2x + 2yz \\ 2xz \\ 2xy + 2z \end{bmatrix}$$

b):-

$$\begin{bmatrix} 2x + 2xz \\ 2yz \\ 2xy + z \end{bmatrix}$$

c):-

$$\begin{bmatrix} 2x + 2yz \\ 2xy \\ 2xy + z \end{bmatrix}$$

d):-

$$\begin{bmatrix} 2yz + 2xz \\ 2z \\ 2x \end{bmatrix}$$

Answer:- a

(4) $f(x,y,z) = x^2 + 2xyz + z^2 \rightarrow (1)$

$\nabla f(x,y,z) = \begin{bmatrix} \partial f/\partial x \\ \partial f/\partial y \\ \partial f/\partial z \end{bmatrix}$

$\frac{\partial f}{\partial x} = 2x + 2yz \rightarrow (A)$

$\frac{\partial f}{\partial y} = 2xz \rightarrow (B)$

$\frac{\partial f}{\partial z} = 2xy + 2z \rightarrow (C)$

$\therefore$ (4)

$\nabla f(x,y,z) = \begin{bmatrix} 2x + 2yz \\ 2xz \\ 2xy + 2z \end{bmatrix}$