

## Unit 2: Multivariate Calculus Quiz

### Question 1

Find the partial derivatives if the following functions:

A)  $f(x, y) = x^4y + 2x$

$$\frac{df(x,y)}{dx} = 4x^3y+2$$

$$\frac{df(x,y)}{dy} = x^4$$

B)  $f(x, y) = 2y + 3x^2$

$$\frac{df(x,y)}{dx} = 6x$$

$$\frac{df(x,y)}{dy} = 2$$

### Question 2

The direction of maximum decrease for an objective function  $f(\mathbf{x})$  is given by the:

A. Gradient ( $\nabla$ )

B. Negative Gradient ( $-\nabla$ )

C. Jacobian Matrix ( $\mathbf{J}$ )

D. Laplacian ( $\nabla^2$ )

### Question 3

Fill in the blank: The definite integral of  $f(x)$  is a number and represents the area under the curve from  $x = a$  to  $x = b$ . The indefinite integral of  $f(x)$  has no limits and returns a function.

### Question 4

The critical point of a convex function is guaranteed to be a \_\_\_\_\_ minimum.

### Question 5

Find the global minimum for the objective function,  $f(x) = 2x^2 - 3$ .