11.3 Derivatives

Notations

If $z = f(x, y)$,

$$f_x(x, y) = f_x = \frac{df}{dx} = \frac{d}{dx}f(x, y)$$

$$f_y(x, y) = f_y = \frac{df}{dy} = \frac{d}{y}f(x, y)$$

$$\frac{dz}{dy}, \quad f_2, \quad, \quad D_2f, \quad D_yf$$

Rules for Finding Partial Derivatives

1) To find f_x, regard y as a constant and differentiate $f(x, y)$ with respect to x.

2) To find f_y, regard y as a constant and differentiate $f(x, y)$ with respect to y.

Ex 1

If $f(x, y) = x^3 + x^2y^3 - 2y^2$, find $f_x(2, 1)$ & $f_y(2, 1)$.

$$f_x(x, y) = \frac{d}{dx}x^3 + \frac{d}{dx}(x^2y^3) - \frac{d}{dx}2y^2$$

$$3x^2 + y^3 \cdot \frac{d}{dx}x^2 - 0 \to 3x^2 + 2xy^3$$

$$f_x(2, 1) = 3(2)^2 + 2(2)(1)^3 \to \boxed{16}$$

$$f_y(x, y) = \frac{d}{dy}x^3 + \frac{d}{dy}(x^2y^3) - \frac{d}{dy}2y^2.$$