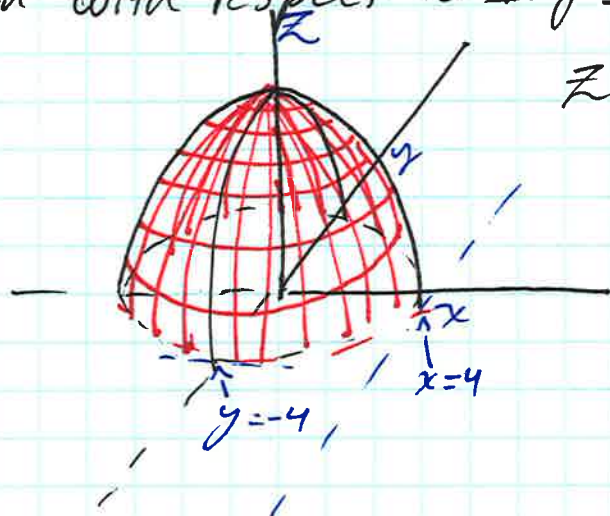


# Partial Derivatives.

Are used to determine the rate of Change of a multivariate function with respect to only 1 of the Independent Variables.



$$z = f(x, y) = -x^2 - y^2 + 16$$

If we want to know the rate of Change of  $z$  with respect of only 1 variable we need partial derivatives

$$\frac{\partial}{\partial x} f(x, y) = \frac{\partial}{\partial x} -x^2 - y^2 + 16$$

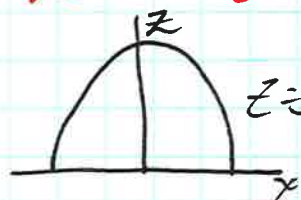
The rate of Change of  $z$  with respect to  $x$  for any fixed Value of  $y$  should be the same because it only depends on  $x$ , hence  $y$  is treated as a Constant.

$$\frac{\partial}{\partial x} -x^2 - y^2 + 16 = -2x$$

Same thing happens with  $y$

$$\frac{\partial}{\partial y} -x^2 - y^2 + 16 = -2y$$

It is similar to evaluating a Cross Section where  $z$  is solely in function of 1 Variable



$$z = f(x) = -x^2 + 16$$

$$\frac{d}{dx} -x^2 + 16 = -2x$$