The intersection of a surface with a coordinate plane is called a **trace**.

The intersection of a surface with a plane parallel to a coordinate plane is called a **section**.

Let $f : \mathbb{R}^2 \to \mathbb{R}$ be a scalar function of 2 variables. The **level curve** at height c of f is the curve in $\mathbb{R}^2$ defined by the equation $f(x, y) = c$, c a constant.

In set notation, $\left\{(x, y) \in \mathbb{R}^2 \mid f(x, y) = c\right\}$.

In higher dimensions, level curves are called level sets.

Definition If $z = f(x, y)$, the **partial derivative of f with respect to x**, denoted f_x $\left(\text{or } \dfrac{\partial f}{\partial x}\right)$, is the function given by

$$f_x(x, y) = \lim_{h \to 0} \frac{f(x+h,\, y) - f(x,\, y)}{h}$$

provided the limit exists.

The **partial derivative of f with respect to y**, denoted f_y $\left(\text{or } \dfrac{\partial f}{\partial y}\right)$, is the function given by

$$f_y(x, y) = \lim_{h \to 0} \frac{f(x,\, y+h) - f(x,\, y)}{h}$$

provided the limit exists.

Procedure to find $f_x(x, y)$ and $f_y(x, y)$

To find f_x treat y as a constant, and differentiate f with respect to x in the usual way.

To find f_y treat x as a constant, and differentiate f with respect to y in the usual way.