$f(x) = x^2 \rightarrow$ Single-Variable.
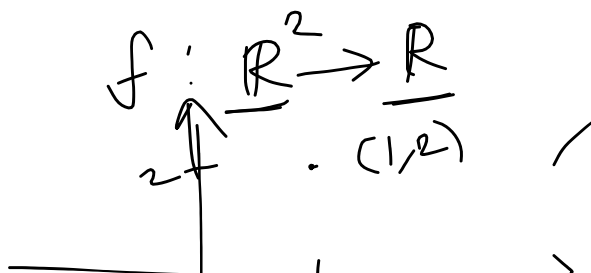
$x \rightarrow$ Domain
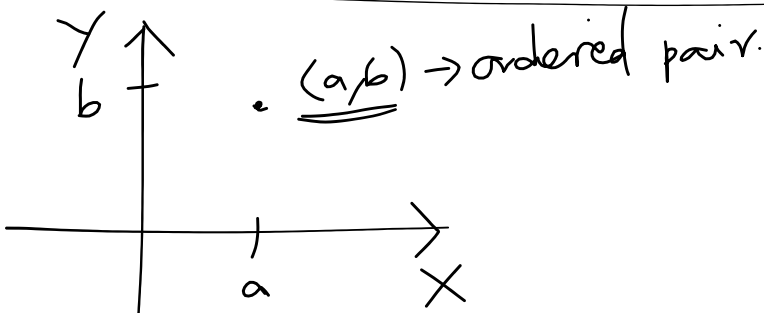
$f(x) \rightarrow$ Range.

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

$$\boxed{x^2 + y^2 = r^2}$$

$x^2 + y^2 = 1$

$f(x, y, z \ldots \ldots n)$

$f(x_1, x_2 \ldots \ldots x_n) \longrightarrow$ function of n-variables.

$(a, b) \rightarrow$ ordered pair.

$f : \mathbb{R}^2 \rightarrow \mathbb{R}$

$(1, 2)$

$$f(x,y) = 2(x+y)$$

$\mathbb{R}^2 \to \mathbb{R}$ (over $\mathbb{R}^2$)
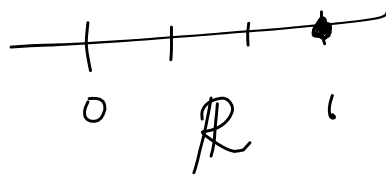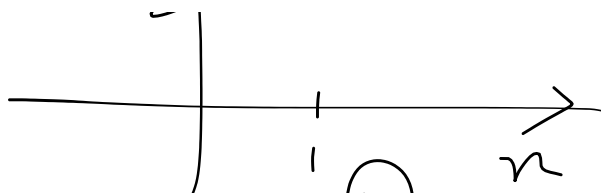
$$f(1,2) = 2(1+2)$$
$$= 2(3)$$
$$= 6$$

$\mathbb{R}^{2\times 1}$ (or) $\mathbb{R}^2 \to \begin{bmatrix} x \\ y \end{bmatrix} = (x,y)$

$\mathbb{R}^{2\times 2}$

$$f(x,y) = \frac{\sqrt{x+y+1}}{x-1}$$

$$f(3,2) = \frac{\sqrt{3+2+1}}{3-1}$$

$$\boxed{\frac{f(3,2)}{\mathbb{R}^2} = \frac{\sqrt{6}}{2\,\mathbb{R}}}$$

$\mathbb{R}^3$
$f(x,y,z) \to x+y+2$

② **find domain**

$$f(x,y) = \frac{\sqrt{x+y+1}}{x-1}$$

$\mathbb{D}^2 \to (-\infty, \infty)$

$x-1$

Denominator $\boxed{x-1}$ $R^2 \Rightarrow (-\infty, \infty)$

$$= \frac{\sqrt{1+1+1}}{0}$$

           $x = 1$

           $\Rightarrow (1, 1)$

$$= \frac{\sqrt{3}}{0} \quad \times$$

Remove $x = 1$ $\underline{x+y+1 \geq 0}$

Numer $\sqrt{\boxed{x+y+1}}$

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② $f(x, y) = x \ln(y^2 - x)$

          $\boxed{y^2 - x > 0}$ $x < y^2$

$f(x, y) = K$

$f(x, y, \cancel{z}) = K$

$f(x, y) = 6 - 3x - 2y$

for the values of

$K = -6, 0, 6, 12$

$$f(x,y) = K$$

$$6 - 3x - 2y = K$$

$$3x + 2y + (K - 6) = 0$$

8b $K = -6$

① $\quad 3x + 2y - 12 = 0$

② $\quad 3x + 2y - 6 = 0 \quad (K = 0)$