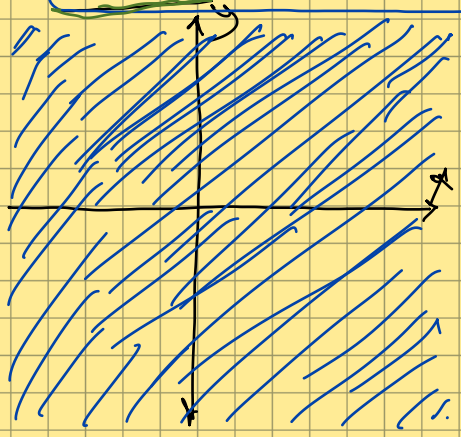
$\mathbb{R} \times \mathbb{R}$ $\{(x,y) : x,y \in \mathbb{R}\}$



$\mathbb{N} \times \mathbb{N}$

$\mathbb{N} \times \mathbb{R}$

$\mathbb{R} \times \mathbb{N}$

$\mathbb{R} \times \mathbb{R}$

$\mathbb{R} \times \mathbb{R}$ → coordinate plane / cartesian plane

$A = \{a, b, c\}$ $B = \{q, r\}$ $C = \{1, 2\}$

$A \times B \times C = \{(a,q,1), (a,q,2), (a,r,1), (a,r,2), \ldots\}$

$|A \times B \times C| = ?$ $|A| \times |B| \times |C| = 3 \times 2 \times 2 = 12$

ordered pair

ordered triple

$A \times A = ?$ $\{(a,a), (a,b), (b,a) \ldots\}$

A^2 $|A \times A| = 3 \cdot 3 = 9$

$\underbrace{A \times A \times \ldots \times A}_{n} = A^n$ → Cartesian Power

$A^n = \{\underbrace{(x_1, x_2, \ldots, x_n)}_{n\text{-tuple}} : x_1, x_2, \ldots, x_n \in A\}$

k-ary tuple

- ordered pair → (x, y)
- ordered triple → (x, y, z)
- 4-tuple → (x, y, z, n)

k → number of items

1. ✓ $\mathbb{R} \times \mathbb{R} = \mathbb{R}^2$ → coordinate plane
2. $\mathbb{R} \times \mathbb{R} \times \mathbb{R} = \mathbb{R}^3$ → 3-D space
3. $\mathbb{Z} \times \mathbb{Z} = \mathbb{Z}^2$ → grid of points
4. $\mathbb{Z} \times \mathbb{Z} \times \mathbb{Z} = \mathbb{Z}^3$ → grid of points in 3D-space