$X = [0,1] \subseteq \mathbb{R}$ $\quad [0,1] = \{x : x \in \mathbb{R}, 0 \le x \text{ and } x \le 1\}$

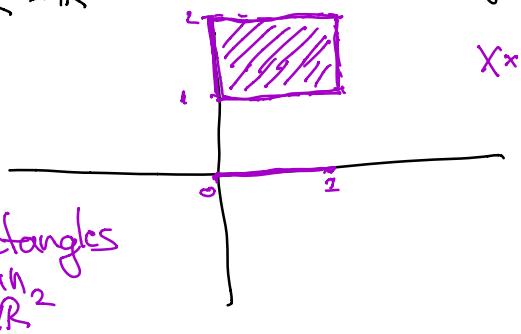
$Y = [1,2] \subseteq \mathbb{R}$ $\quad [1,2] = \{x : x \in \mathbb{R}, 1 \le x \le 2\}$.

What does $X \times Y$ look like?

$$X \times Y = \{(x,y) : x \in X, y \in Y\}$$

$$= \{(x,y) : 0 \le x \le 1, x \in \mathbb{R} \text{ and } y \in \mathbb{R}, 1 \le y \le 2\}.$$

$X \times Y \subseteq \mathbb{R} \times \mathbb{R} = \mathbb{R}^2$ $\quad \mathbb{R} \times \mathbb{R} = \{(x,y) : x \in \mathbb{R}, y \in \mathbb{R}\}$



$X \times Y$ is the purple square.

Cartesian Products of intervals $\Longleftrightarrow$ rectangles in $\mathbb{R}^2$