$S = \{1, 2, 3\}$

$T = \{A, B\}$

$S \times T = \{(1,A), (1,B), (2,A), (2,B), (3,A), (3,B)\}$

$T \times T = \{(A,A), (A,B), (B,A), (B,B)\}$

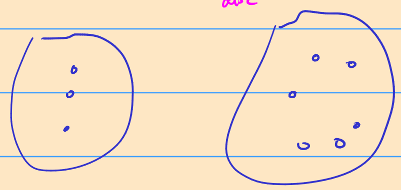
$\left(\frac{1}{2}, \frac{3}{101}\right) \in \mathbb{Q} \times \mathbb{Q}$

$\left(\frac{51}{37}, \frac{1001}{907}\right) \in \mathbb{Q} \times \mathbb{Q}$ countable

disc

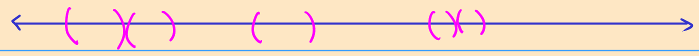
$f: D \to \mathbb{Q} \times \mathbb{Q} \quad : \quad f(d_1) = f(d_2) \Rightarrow d_1 = d_2$

$D = \{ \underbrace{\{(x, y) : (x - x_0)^2 + (y - y_0)^2 \leq r\}}_{\text{disc}} \}$



$\mathcal{I} = \{ \underbrace{(x_0, x_1)}_{\text{interval}} \text{ for } \underset{x_0 \neq x_1}{x_0, x_1, \ldots} \}$

$(1,2) \cap (2,3) = \emptyset$



$f(i)$ return a rational number $\in i$

$\mathcal{I}$ is countable.

$f: \mathcal{I} \to \mathbb{Q}$

every input maps to a unique output

Prove SAME CARDINALITY bijection

Prove COUNTABILITY injection into $\mathbb{N}$ or some countable set