

Assignment 2 1124 Due Wednesday 18th Feb.

1. Try to copy the construction $\mathbb{N} \rightarrow \mathbb{Z}$ that we did to get $\mathbb{Z} \rightarrow \mathbb{Q}$, and show that $\mathbb{Q}$ is a field.

2. On $\mathbb{R} \times \mathbb{R}$ define $(a, b) \sim (c, d)$ means $b = d$.
Prove it is an equivalence reln.
What are the equivalence classes?
Choose a natural set of equivalence class representatives.

3. On $X = [0, 1] \times [0, 1]$.

Define $(x_1, y_1) \sim (x_2, y_2)$ means

$$x_1 = x_2 \text{ and } y_1 = y_2 \text{ if } y_i \neq 0, 1.$$

$$\text{or } y_1 = 1 \text{ and } y_2 = 0 \\ \text{or } y_1 = 0 \text{ and } y_2 = 1. \\ \text{or } y_1 =$$

Prove this is an equiv. reln.

and identify $X/\sim$ as a geometric object.