Assignment 2  11.24   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 relation. 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 $x_1 = x_2$ and $y_1 = y_2$ or $y_1 = 0$ and $y_2 = 1$ and $x_1 \neq 0, 1$. Prove this is an equivalence relation, and identify $X/\sim$ as a geometric object.