

Math 206 — Partitions

Problem 1. Let \mathcal{A} be a partition of a nonempty set X . Define a relation \sim on X by $x \sim y$ if and only if $x, y \in A$ for some $A \in \mathcal{A}$ (ie. if and only if x and y are in the same partition element). Prove that \sim is an equivalence relation.

Problem 2. For each $r \in \mathbb{R}$, let $A_r = \{(x, y) \in \mathbb{R}^2 : x + y = r\}$ and let $\mathcal{A} = \{A_r : r \in \mathbb{R}\}$.

- a. Make a sketch of a few elements of \mathcal{A} .
- b. Prove that \mathcal{A} is a partition of \mathbb{R}^2 .
- c. Consider the equivalence relation \sim which \mathcal{A} gives rise to.
 1. Explain in geometric terms what it means for $(x, y) \sim (u, v)$.
 2. What are the elements of the equivalence class of $(2, 2)$?