

Math 113 Definitions.

1. **Set.** A set is an unordered collection of elements.
2. **Map.** A map from X to Y is $f : X \rightarrow Y$ (a rule that assigns elements to Y to elements in X). So, for any $x \in X$ there exists a unique $y \in Y$ such that $f(x) = y$.
3. **Cartesian Product.** The Cartesian product of X and Y is the set $X \times Y = \{(x, y) \mid x \in X, y \in Y\}$.
4. **Equivalence Relation.** An equivalence relation R, \sim on X is a subset $R \subseteq X \times X$ such that
 - (a) Reflexive. $((x, x) \in R \text{ for all } x \in X)$.
 - (b) Symmetric. $(\text{if } (x, y) \in R, \text{ then } (y, x) \in R)$.
 - (c) Transitive. $(\text{if } (x, y) \in R \text{ and } (y, z) \in R, \text{ then } (x, z) \in R)$.
5. **Equivalence Class.** Let X be a set and R be an equivalence relation on X . Then, an equivalence class of $x \in X$ is the set $[x] = [x]_R = [x]_{\sim} = \{a \in X \mid x \sim a\}$.
6. $\mathbb{Z}/m\mathbb{Z}$. The set of distinct equivalence classes of $\equiv \pmod{n}$ is $\mathbb{Z}/m\mathbb{Z}$.