MAS 4301

Homework 1

Due January 16th, 2026

1. Consider the sets

   (a) $A = \{\{1, 2, 3, 6\}, \{1, 3\}\}$.

   (b) $B = \{1, 2, 3\}$.

   (c) $C = \{1, 1, 1\}$.

   What is the cardinality of A ? What is the cardinality of B ? What is the cardinality of C ? What is the intersection $A \cap B$?

2. Let A and B be sets and let $f : A \to B$ be a function. Define a relation on A as follows. If $a, b \in A$, we say that aRb if and only if there exists some $c \in B$ such that $f(a) = c$ and $f(b) = c$. Prove that R is an equivalence relation on A.

3. Let A and B be sets and let $f : A \to B$ be a function. Define a relation on B as follows. If $a, b \in B$, we say that aRb if and only if there exists some $c \in A$ such that $f(c) = a$ and $f(c) = b$. Prove that R need not be an equivalence relation.