CS 173 Discussion 4: Sets, Functions, and Relations

Date: September 19/20, 2019.

Problem 1. Let A, B, and C be arbitrary sets. Prove or disprove each of the following claims.

1. $(A - C) - (B - C) \subseteq (A - B)$.
2. $(A - B) \subseteq (A - C) - (B - C)$.

Problem 2. Suppose $f : \mathbb{N} \to \mathbb{N}$ is surjective (onto). Define $g : \mathbb{N} \times \mathbb{N} \to \mathbb{N}$ as

$$g(x, y) = f(x)f(y).$$

Prove that g is surjective (onto).

Problem 3. Suppose $f : \mathbb{Z} \to \mathbb{Z}$ is injective (1-to-1). Define $g : \mathbb{Z} \to (\mathbb{Z} \times \mathbb{Z})$ such that

$$g(x) = (2f(x), |f(x)|).$$

Prove that g is injective (1-to-1).