

Homework 5

MATH 300

(due Oct 11)

Oct 4, 2024

Problem 1. Prove that for any two sets A, B , $A = B$ if and only if $A \Delta B = \emptyset$

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Problem 2. Compute the following sets. No proof required.

1. $\{a + b : a \in \{0, 5\}, b \in \{2, 4\}\} \setminus \{7, 10\}$.

2. $(1, 3) \cup [2, 4)$

3. $\mathbb{Z} \cap [0, \infty)$

4. $\mathbb{N}_{\text{even}} \Delta \mathbb{N}_+$

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Problem 3. Let X and Y be sets.

- (i) Prove that $Y \setminus (Y \setminus X) = X \cap Y$.
- (ii) Prove that $X \subseteq Y$ if and only if $X \cup Y = Y$.

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Problem 4. Prove that if $A \cap B \subseteq C$ and $x \in A \setminus C$, then $x \notin B$.

[Hint: Prove it by contradiction.]