Analysis 1+, MATH 4217/5217, Fall 2025

Homework 1, Sections 1-1, Sets and Functions, and 1-2, Properties of the Real Numbers as an Ordered Field

Due Saturday, August 30, at 11:59 p.m.

Write in complete sentences and paragraphs!!! *Explain* what you are doing and convince me that you understand what you are doing and why. Justify all steps by quoting relevant results from the hypotheses, class notes, or textbook. Use the notation and techniques described in the in-class hints (this is part of the instructions!). Do not copy the work of others (including websites or AI generated solutions). If you have any questions, then contact me (`gardnerr@etsu.edu`).

1.1.8(a). Prove $(\cap_{i\in I} A_i)^c = \cup_{i\in I}(A_i^c)$.

1.1.13(a). Let $f : X \to Y$ with $A_1, A_2 \subset X$ and $B_1, B_2 \subset Y$. Prove $f(A_1 \cup A_2) = f(A_1) \cup f(A_2)$.

1.2.1(a). The multiplicative identity in a field is unique.

1.2.3 If $\mathbb{F}$ is an ordered field and $a, b, c \in \mathbb{F}$ with $c < 0$ and $a < b$, then $ac > bc$.

G.1(a). (Graduate Problem) The *symmetric difference* between sets A and B, denoted $A \triangle B$, is defined as

$$A \triangle B = \{x | x \in A \text{ or } x \in B \text{ but } x \notin A \cap B\}.$$

Prove $A \triangle B = (A \setminus B) \cup (B \setminus A)$.