

MATH 2010 FALL 2026 PRACTICE TEST #1

*Write clearly, on separate paper. All questions carry equal weight.
You will receive credit for your three best answers.*

Prove or disprove three of the following statements:

- (1) Suppose that X and Y are finite sets. Then

$$|X \cup Y| = |X| - |X \cap Y| + |Y|.$$

- (2) The number $\log_9 8$ is irrational.

- (3) Let x be a real number. If $q \in \mathbb{Q}$ and $qx \in \mathbb{R} \setminus \mathbb{Q}$, then $x \notin \mathbb{Q}$.

- (4) If $x^5 < y^5$, then $x < y$.