MATH 2010 FALL 2025 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) If A and B are sets, then
$$\overline{A \cup (B \smallsetminus C)} = C \smallsetminus A\,.$$

(2) The number $\log_{10} 9$ is irrational.

(3) There are prime numbers $p > q > 5$ for which $p - q = 11$.

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