

MATH 201 FALL 2021 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) For subsets A, B, C of a universe U , one has

$$A \cup (\overline{B} \setminus C) = (A \cup \overline{B}) \setminus (C \setminus A).$$

(2) If $x < y < 0$, then $x^4 < y^4$.

(3) The real number $\log_9 16$ is irrational.

(4) For $3 < n \in \mathbb{Z}$, one has

$$\binom{n}{3} - \binom{n}{2} = \frac{n(n-1)(n-5)}{6}.$$