

MATH 201 SPRING 2024 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

$$A \cup (B \setminus C) = (A \cup B) \cup (A \setminus C).$$

- (2) For integers x and y , if $3x + 5y$ is even, then x and y have the same parity.
- (3) If n is an integer, then $4 \nmid n^2 + 1$.
- (4) If x and y are positive real numbers, then

$$xy \leq \frac{1}{4}x^2 + y^2.$$