

MATH 201B SPRING 2010 PRACTICE TEST #1

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

- (1) Let x and y be integers. If $x + 5y$ is odd, prove that x and y have opposite parity.
- (2) For an odd integer n , prove that $4 \mid n^3 + n^2 + n + 1$.
- (3) Let x and y be positive real numbers. Prove that

$$\frac{x}{y} + \frac{y}{x} \geq 2.$$

- (4) Let A , B and C be sets. Prove that

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