

MATH 201A FALL 2010 PRACTICE TEST #2

Write clearly, on separate paper. All questions carry equal weight.

(1) Prove

$$\forall 0 < x \in \mathbb{R}, \forall 1 < n \in \mathbb{Z}, (1+x)^n > 1+nx$$

by induction on n .

(2) Prove or disprove:

For sets A, B and C ,

$$\begin{aligned} (A \setminus B) \cup (B \setminus C) \cup (C \setminus (A \cup B)) \\ = (A \cup B \cup C) \setminus (A \cap B \cap C). \end{aligned}$$

(3) Prove or disprove:

$$\exists n \in \mathbb{N}. 5 \nmid (4^{2n} - 1).$$