

MATH 201B SPRING 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:

$$\forall n \in \mathbb{N}, 3^n > n^2.$$

(3) Prove or disprove:

$$\forall n \in \mathbb{N}, 5 \mid (4^n + 1)(4^n - 1).$$