

MATH 201 SPRING 2018 PRACTICE TEST #2

Write clearly, on separate paper.

(1) [5pts.] Consider $E = \{x \in \mathbb{Q} \mid x^2 < 2\}$. Give a careful formal proof that $\sup E = \sqrt{2}$.

(2) [5pts.] Consider a real number x with $|x| < 1$. Show that

$$|1 + x - x^2 + x^3| \leq \frac{1 - |x|^4}{1 - |x|}.$$

(3) [4pts.] Find a number M such that $|x^3 - x^2 + 4x| \leq M$ for all $-2 \leq x \leq 3$. Justify your claim.