

## MATH 201 SPRING 2021 PRACTICE TEST #2

*Write clearly, on separate paper.*

- (1) [5pts.] Let  $\{E_i \mid i \in I\}$  be an indexed family of nonempty subsets of a bounded subset  $E$  of  $\mathbb{R}$ . Show that

$$\sup \bigcup_{i \in I} E_i = \sup \{ \sup E_i \mid i \in I \}.$$

- (2) [4pts.] Find a number  $M$  such that  $|x^3 + 4x^2 - 10| \leq M$  for all  $-3 \leq x \leq 2$ . Justify your claim.
- (3) [5pts.] Prove directly, from the definition of the limit of a sequence, that

$$\lim_{n \rightarrow \infty} \frac{2}{n^3} = 0.$$