

Problems (Due September 27 at 11:59 pm)

- ① Prove that the set $W = \{x \in \mathbb{R} : x^3 - 2x + 5 \in \mathbb{Q}\}$ is countable. (Here \mathbb{R} is the set of all real numbers and \mathbb{Q} is the set of all rational numbers.)
- ② Prove that the set $S = \{b : x^4 + bx - 5 = 0 \text{ has a rational root}\}$ is countable.
- ③ Determine if the set $B = \{x + \sqrt{2}y : x, y \in \mathbb{N}\}$ is countable or not. (Here $\mathbb{N} = \{1, 2, 3, \dots\}$).