

Mathematics I

First Practice

1. Given the following subsets of \mathbb{Z} :

$$A := \{1, 2, 3\},$$

$$B := \{0\},$$

$$C := \{-1, 0, 1\},$$

$$D := \{1, 2, -3, 4, 0, 5\},$$

$$E := \{0, 1, 2\},$$

$$F := \{5\},$$

$$G := \{n \mid n \geq 1\}, \quad H := \{n \mid n \leq -1\}, \quad I := \{(-1)^n n \mid n \geq 1\}.$$

compute the set operations:

$$\begin{array}{llll} a) & A \cup B; & b) & A \cap B; & c) & A \cup C; & d) & B \cup C; \\ e) & A \cap C; & f) & B \cap C; & g) & A \cap D; & h) & B \cap D; \\ i) & A \cup E; & j) & A \cap E; & k) & B \cap F; & l) & D \setminus C; \\ m) & D \setminus (C \cup F); & n) & G \cup H; & o) & F \cap I; & p) & C \cap I; \\ q) & (E \cup F) \cap G; & r) & D \cap I; & s) & D \setminus I; & t) & I \setminus H \end{array}$$

2. Given the following subsets of \mathbb{Q} :

$$A := \{0, \frac{1}{2}\}$$

$$B := \{\frac{1}{n} \mid n \in \mathbb{N}\}$$

$$C := \{-\frac{1}{n} \mid n \in \mathbb{N}\}$$

$$D := \left\{\frac{(-1)^n}{n} \mid n \in \mathbb{N}\right\}$$

$$E := \{x \in \mathbb{Q} \mid 4x^2 - 1 = 0\} \quad F := \{x \in \mathbb{Q} \mid x^2 - 2 = 0\}$$

compute the set operations:

$$\begin{array}{llll} a) & A \cap B; & b) & C \cap D; & c) & A \cup E; & d) & E \setminus F; \\ e) & (B \cap D) \setminus E; & f) & (B \setminus D) \cup (D \setminus B); \end{array}$$

3. For each of the following subsets determine the minimum (*min*) and the maximum (*max*), if they exist:

$$A := \{-1, 0, 3\};$$

$$B := \{-4, 1, 5, -5, 3\};$$

$$C := \left\{-1, \frac{3}{5}, -\frac{7}{6}, \frac{3}{2}, 1\right\};$$

$$D := \left\{-\frac{11}{10}, \frac{3}{5}, -\frac{5}{2}, \frac{7}{3}, \frac{15}{12}\right\};$$

$$E := \left\{\frac{1}{n} \mid n \in \mathbb{N}\right\};$$

$$F := \left\{\frac{(-1)^n}{n} \mid n \in \mathbb{N}\right\};$$

$$G := \left\{\frac{2}{3}, 0, -1\right\} \cup \left\{\frac{1}{n} \mid n \in \mathbb{N}\right\};$$

$$H := \left\{(-1)^n + \frac{1}{2^n} \mid n \in \mathbb{N}\right\};$$