

Instructions

- Answer each question completely; justify your answers.
 - This assignment is due at 9:00 am on October 10, 2001.
1. Exercise 1.2.23
 2. Let $A = \{1, 2, 3, 6, 9\}$, $B = \{0, 2, 4, 6, 8\}$, and $C = \{0, 6, 9\}$.
 - (a) Draw a Venn diagram showing the relationship between the sets. Label each element.
 - (b) What are:
 - i. $(B \oplus C) \setminus A$
 - ii. $A \oplus B$
 - iii. $\mathcal{P}(B \cap C)$
 - iv. $(A \cap C) \times B$
 3. Let $A = (-\infty, -2]$, $B = (-3, 8]$, $C = (5, 25)$, and $U = \mathbb{R}$. What are:
 - (a) $A \cap B$
 - (b) $A \cup C$
 - (c) $A^c \setminus (B \cup C)$
 - (d) $(B \cup C)^c \setminus (A \cup B)$
 - (e) $A \oplus B \oplus C$
 - (f) $C \setminus B^c$
 4. Exercise 2.2.18, part (b).
 5. Exercise 2.2.25 (except part (a)).
 6. For each binary relation \mathcal{R} determine whether \mathcal{R} is reflexive, symmetric, anti-symmetric, and/or transitive.
 - (a) $\mathcal{R} = \{(1, 5), (5, 8), (5, 1), (8, 1)\}$
 - (b) $\mathcal{R} = \{(x, y) \in \mathbb{Z}^2 \mid x^2 - 2y^2 \text{ is even}\}$
 - (c) $\mathcal{R} = \{(x, y) \in \mathbb{R}^2 \mid x^2 + y^4 \leq 9\}$
 - (d) $\mathcal{R} = \{(x, y) \in \mathbb{Q}^2 \mid xy \leq 0\}$