

Instructions

- Answer each question completely; justify your answers.
- This assignment is due at 4:00 pm on 04 February 2008.

1. Exercise 0.2.30

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 2.2.20.

5. Exercise 2.2.27 (except part (a)).

6. Exercise 2.2.28 (except part (e)).

7. 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) $\mathcal{R} = \{(x, y) \in \mathbb{Q}^2 \mid xy \leq 0\}$

8. Exercise 2.3.6.