**3.3.2.** Let $C = \{a, b, c, d, e, f\}$ and $D = \{a, c, e\}$ and $E = \{d, e, f\}$ and $F = \{a, b\}$. Find each of the following sets.

(1) $C - (D \cup E)$.
(2) $(C - D) \cup E$.
(3) $F - (C - E)$.
(4) $F \cap (D \cup E)$.
(5) $(F \cap D) \cup E$.
(6) $(C - D) \cup (F \cap E)$.

**3.3.3.** Let $X = [0, 5)$ and $Y = [2, 4]$ and $Z = (1, 3]$ and $W = (3, 5)$ be intervals in $\mathbb{R}$. Find each of the following sets.

(1) $Y \cup Z$.
(2) $Z \cap W$.
(3) $Y - W$.
(4) $X \times W$.
(5) $(X \cap Y) \cup Z$.
(6) $X - (Z \cup W)$.

**3.3.4.** Let

$$\begin{aligned} G &= \{n \in \mathbb{Z} \mid n = 2m \text{ for some } m \in \mathbb{Z}\} \\ H &= \{n \in \mathbb{Z} \mid n = 3k \text{ for some } k \in \mathbb{Z}\} \\ I &= \{n \in \mathbb{Z} \mid n^2 \text{ is odd}\} \\ J &= \{n \in \mathbb{Z} \mid 0 \leq n \leq 10\}. \end{aligned}$$

Find each of the following sets.

(1) $G \cup I$.
(2) $G \cap I$.
(3) $G \cap H$.
(4) $J - G$.
(5) $I - H$.
(6) $J \cap (G - H)$.

**3.3.5.** Given two sets $A$ and $B$, consider the sets $A - B$ and $B - A$. Are they necessarily disjoint? Give a proof or a counterexample.

**3.3.6. [Used in Section 3.3.]** Prove Theorem 3.3.2 parts (i) – (iii) and (vi) – (ix).

**3.3.7. [Used in Section 3.3.]** Prove Theorem 3.3.5 parts (i) – (vi).

**3.3.8. [Used in Section 3.3.]** Prove Theorem 3.3.8 parts (i), (ii), (iv), (v).

**3.3.9.** Let $X$ be a set, and let $A, B, C \subseteq X$. Suppose that $A \cap B = A \cap C$, and that $(X - A) \cap B = (X - A) \cap C$. Show that $B = C$.

**3.3.10.** Let $A$, $B$ and $C$ be sets. Show that $(A - B) \cap C = (A \cap C) - B = (A \cap C) - (B \cap C)$.

**3.3.11.** For real numbers $a$, $b$ and $c$ we know that $a - (b - c) = (a - b) + c$. Discover and prove a formula for $A - (B - C)$, where $A$, $B$ and $C$ are sets.