

1. Mark each of the following statements as true or false:

(a) $(5, 9) \cap (8, 10) = (8, 9)$

T

F

(b) $\{5, 9\} \cap \{8, 10\} = \{8, 9\}$

T

F

(c) $[5, 9] \cup [8, 10] = [8, 9]$

T

F

(d) $(5, 9) - (8, 10) = (5, 8)$

T

F

(e) $\{5, 9\} - \{8, 10\} = \{5, 7\}$

T

F

(f) $\emptyset \in \{1, 2, 3\}$

T

F

(g) $\emptyset \subseteq \{1, 2, 3\}$

T

F

(h) $\{2\} \in \{1, 2, 3\}$

T

F

(i) $\{2\} \subseteq \{1, 2, 3\}$

T

F

(j) $\mathcal{P}(\{a, b\}) = \{\{\emptyset\}, \{a\}, \{b\}, \{a, b\}\}$

T

F

2. For each $x \in \mathbb{R}^+$, let $W_x = \left\{ y \mid \frac{1}{x} \leq y < \frac{3x+1}{x} \right\}$. What are:

(a) $\bigcup_{x \in \{1,2,3\}} W_x$

(b) $\bigcap_{x \in \{1,2,3\}} W_x$

(c) $\bigcup_{x \in \mathbb{Z}^+} W_x$

(d) $\bigcap_{x \in \mathbb{Z}^+} W_x$

(e) $\bigcup_{x \in \mathbb{R}^+} W_x$

(f) $\bigcap_{x \in \mathbb{R}^+} W_x$

$$3. (A \cup B)' = A' \cap B'$$

4. Show that if $b \in \mathbb{R}$ with $b > 0$, then $\forall n \in \mathbb{N}, b^n > 0$.

5. $\forall x, y \in \mathbb{R}, |x| < y \Rightarrow -y < x < y.$