

1. (a) What is  $\{1, 4\} \cap \{3, 4\}$ ?
  
- (b) What is  $(1, 4) \cap [3, 4]$ ?
  
- (c) What is  $[1, 4] \cap (3, 4)$ ?
  
- (d) What is  $\{1, 4\} \cup \{3, 4\}$ ?
  
- (e) What is  $(1, 4) \cup [3, 4]$ ?
  
- (f) What is  $[1, 4] \cup (3, 4)$ ?
  
- (g) What is  $\{1, 4\} - \{3, 4\}$ ?
  
- (h) What is  $(1, 4) - [3, 4]$ ?
  
- (i) What is  $[1, 4] - (3, 4)$ ?
  
- (j) What is  $\mathcal{P}\{1, 4\}$ ?

2. (a) State the definition of

$$\bigcap_{i \in I} A_i$$

(b) Let  $P$  be the set of positive real numbers. For each  $x \in P$ , let  $A_x = [x, 2x]$ . Find

$$\bigcap_{x \in P} A_x$$

(c) Let  $P$  be the set of positive real numbers. For each  $x \in P$ , let  $A_x = [x, 2x]$ . Find

$$\bigcup_{x \in P} A_x$$

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

4. For any sets  $A, B$ , and  $C$ ,  $(B - A) \subseteq (C - A) \cup (B - C)$ .

5. (a) If  $0 < a$  and  $a < b$ , then  $a^2 < b^2$ .

(b)  $\forall x \in \mathbb{R}, |x| \geq 0$ .