Take-Home Exercises 1(4)
Discrete Mathematics (HKGAB4) 1998:
Sets

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Sets

1. Let $A = \{9, 1, 2, d, e, f\}$, $B = \{1, 2, e\}$, $C = \{9\}$, $D = \{\{1, d\}, \{2, f\}\}$, and assume that the universe U is the union of the sets A, B, C, and D. Write the following sets as lists:
   (a) $A \cup (B \cap C)$
   (b) $(A \cup C) \cap B$
   (c) $C - A$
   (d) $(C \cup D) - A$
   (e) D'
   (f) $(B \cup C)'$
   (g) $B \cap C'$
2. Let $A = \{1, 2, 3\}$ and $B = \{17, 42\}$.
   (a) Does $2 \in A$ hold?
   (b) Does $\{2\} \in A$ hold?
   (c) Does $2 \subset A \cup B$ hold?
   (d) Does $\{17\} \subset A \cup B$ hold?
3. Write the following sets as lists:
   (a) $\mathcal{P}(\{banana, orange, tomato\})$
   (b) $\mathcal{P}(\{\mathcal{P}(\emptyset), \emptyset\})$
   (c) $\mathcal{P}(\{\emptyset\})$
4. Let A, B, and C be sets , and let the universe U be the union of A, B, and C. Show that the following propositions hold, using the equivalences on page 18 in the book.
   (a) $A \cup (A' - B) = A \cup B'$
   (b) $B \subseteq A' \cup B$
5. Draw Venn diagrams for the following set expressions, for the sets A, B, and C.
   (a) $((A \cap B) \cup (A \cap C) \cup (B \cap C)) - (A \cap B \cap C)$
   (b) $A \cap (B \cup C)'$