

SCHC 501 Homework

Problem 4 Consider the following sets:

$$\begin{array}{ll} S1 = \{\{\emptyset\}, \{A\}, A\} & S6 = \emptyset \\ S2 = A & S7 = \{\emptyset\} \\ S3 = \{A\} & S8 = \{\{\emptyset\}\} \\ S4 = \{\{A\}\} & S9 = \{\emptyset, \{\emptyset\}\} \\ S5 = \{\{A\}, A\} & \end{array}$$

Answer the following questions. Remember that the members of a set are the items separated by commas, if there is more than one, between the outermost braces only; a subset is formed by enclosing within braces zero or more of the members of a given set, separated by commas.

- (a) Of the sets $S1 - S9$ which are members of $S1$?
 - (b) Which are subsets of $S1$?
 - (c) Which are members of $S9$?
 - (d) Which are subsets of $S9$?
 - (e) Which are members of $S4$?
 - (f) Which are subsets of $S4$?
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- (a) The three members of $S1$ are $S7$, $S3$, and $S2$.
- (b) The subsets of $S1$ include $S6$, $S8$, $S4$, $S3$, $S5$, and $S1$.
- (c) The two members of $S9$ are $S6$ and $S7$.
- (d) The subsets of $S9$ include $S6$, $S7$, $S8$, and $S9$.
- (e) The one member of $S4$ is $S3$.
- (f) The subsets of $S4$ are $S6$ and $S4$.

Problem 5 Specify each of the following sets by listing its members:

- (a) $\mathcal{P}\{a, b, c\} = \{\emptyset, \{a\}, \{b\}, \{c\}, \{a, b\}, \{b, c\}, \{a, c\}, \{a, b, c\}\}$
- (b) $\mathcal{P}\{a\} = \{\emptyset, \{a\}\}$
- (c) $\mathcal{P}\emptyset = \{\emptyset\}$
- (d) $\mathcal{P}\{\emptyset\} = \{\emptyset, \{\emptyset\}\}$

(e)

$$\begin{aligned}
\mathcal{PP}\{a, b\} &= \mathcal{P}\{\emptyset, \{a\}, \{b\}, \{a, b\}\} \\
&= \left\{ \emptyset, \{\emptyset\}, \{\{a\}\}, \{\{b\}\}, \{\{a, b\}\}, \{\emptyset, \{a\}\}, \{\emptyset, \{b\}\}, \{\emptyset, \{a, b\}\}, \{\{a\}, \{b\}\}, \right. \\
&\quad \{\{a\}, \{a, b\}\}, \{\{b\}, \{a, b\}\}, \{\emptyset, \{a\}, \{b\}\}, \{\emptyset, \{a\}, \{a, b\}\}, \{\emptyset, \{b\}, \{a, b\}\}, \\
&\quad \left. \{\{a\}, \{b\}, \{a, b\}\}, \{\emptyset, \{a\}, \{b\}, \{a, b\}\} \right\}
\end{aligned}$$

Problem 6 Given the following sets:

$$A = \{a, b, c, 2, 3, 4\}$$

$$E = \{a, b, \{c\}\}$$

$$B = \{a, b\}$$

$$F = \emptyset$$

$$C = \{c, 2\}$$

$$G = \{\{a, b\}, \{c, 2\}\}$$

$$D = \{b, c\}$$

(a) $B \cup C = \{a, b, c, 2\}$

(b) $A \cup B = \{a, b, c, 2, 3, 4\}$

(c) $D \cup E = \{a, b, c, \{c\}\}$

(d) $B \cup G = \{a, b, \{a, b\}, \{c, 2\}\}$

(e) $D \cup F = \{b, c\}$

(f) $A \cap B = \{a, b\}$

(g) $A \cap E = \{a, b\}$

(h) $C \cap D = \{c\}$

(i) $B \cap F = \emptyset$

(j) $C \cap E = \emptyset$

(k) $B \cap G = \emptyset$

(l) $A - B = \{c, 2, 3, 4\}$

(m) $B - A = \emptyset$

(n) $C - D = \{2\}$

(o) $E - F = \{a, b, \{c\}\}$

(p) $F - A = \emptyset$

(q) $G - B = \{\{a, b\}, \{c, 2\}\}$

Problem 7 Given the sets in Problem 6, assume that $U := \bigcup\{A, B, C, D, E, F, G\}$. List the members of the following sets:

(a) $(A \cap B) \cup C = \{a, b, c, 2\}$

(b) $A \cap (B \cup C) = \{a, b, c, 2\}$

(c) $(B \cup C) - (C \cup D) = \{a\}$

(d) $A \cap (C - D) = \{2\}$

(e) $(A \cap C) - (A \cap D) = \emptyset$

(f) $G' = \{a, b, c, 2, 3, 4, \{c\}\}$

(g) $(D \cup E)' = \{2, 3, 4, \{a, b\}, \{c, 2\}\}$

(h) $D' \cap E' = \{2, 3, 4, \{a, b\}, \{c, 2\}\}$

(i) $F \cap (A - B) = \emptyset$

(j) $(A \cap B) \cup U = \{a, b, c, 2, 3, 4, \{c\}, \{a, b\}, \{c, 2\}\}$

(k) $(C \cup D) \cap U = \{b, c, 2\}$

(l) $C \cap D' = \{2\}$

(m) $G \cup F' = \{a, b, c, 2, 3, 4, \{c\}, \{a, b\}, \{c, 2\}\}$

(n) $(B \cap C)' = \{a, b, c, 2, 3, 4, \{c\}, \{a, b\}, \{c, 2\}\}$