Solution 8

2.1

08. $B \subseteq A \quad C \subseteq A \quad C \subseteq D$

12. a) $\emptyset \in \{\emptyset\}$ true

    b) $\emptyset \in \{\emptyset, \{\emptyset\}\}$ true

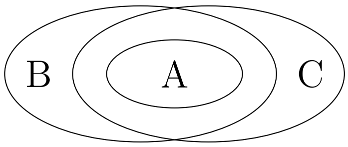
    c) $\{\emptyset\} \in \{\emptyset\}$ false

    d) $\{\emptyset\} \in \{\{\emptyset\}\}$ true

    e) $\{\emptyset\} \subset \{\emptyset, \{\emptyset\}\}$ true

    f) $\{\{\emptyset\}\} \subset \{\emptyset, \{\emptyset\}\}$ true

    g) $\{\{\emptyset\}\} \subset \{\{\emptyset\}, \{\emptyset\}\}$ false

18. 

24. Contrapositive: if $A \neq B$, then A and B are two sets with not same power set.
    let $P(X)$ means the power set of X.
    $\because A \subseteq P(A)$ and $B \subseteq P(B)$
    $\therefore P(A) \neq P(B)$
    So, $A = B$, if A and B are two sets with the same power set.

34. a) $\{(a,x,0),(a,x,1),(a,y,0),(a,y,1),(b,x,0),(b,x,1),$
    $(b,y,0),(b,y,1),(c,x,0),(c,x,1),(c,y,0),(c,y,1)\}$

    b) $\{(0,x,a),(0,x,b),(0,x,c),(0,y,a),(0,y,b),(0,y,c),$
    $(1,x,a),(1,x,b),(1,x,c),(1,y,a),(1,y,b),(1,y,c)\}$

    c) $\{(0,a,x),(0,a,y),(0,b,x),(0,b,y),(0,c,x),(0,c,y)$
    $(1,a,x),(1,a,y),(1,b,x),(1,b,y),(1,c,x),(1,c,y\})$

    d) $\{(x,x,x),(x,x,y),(x,y,x),(x,y,y),$
    $(y,x,x),(y,x,y),(y,y,x),(y,y,y),\}$

48. a) $\{1,2,3,4,\dots\}$

    b) $\emptyset$

    c) $\{\dots,-3,-2,-1,2,3,4,\dots\}$

2.2

04. Find $A \subseteq B$

a) $A \cup B = B = \{a, b, c, d, e, f, g, h\}$

b) $A \cap B = A = \{a, b, c, d, e\}$

c) $A - B = \emptyset$

d) $B - A = \{f, g, h\}$

21. a) Proof is as follows.

A	B	$A - B$	$\overline{B}$	$A \cap \overline{B}$
0	0	0	1	0
0	1	0	0	0
1	0	1	1	1
1	1	0	0	0

b) Proof is as follows.

A	B	$A \cap B$	$\overline{B}$	$A \cap \overline{B}$	$(A \cap B) \cup (A \cap \overline{B})$
0	0	0	1	0	0
0	1	0	0	0	0
1	0	0	1	1	1
1	1	1	0	0	1

32. a) No. $A = \{1\}, B = \{1, 2\}, C = \{1, 2, 3\} \quad A \cup C = B \cup C = C \; but \; A \neq B$

b) No. $A = \emptyset, B = \{1\}, C = \{2, 3\} \quad A \cap C = B \cap C = \emptyset \; but \; A \neq B$

c) Yes.

Suppose $A \neq B$, let $x_0 \in A, x_0 \notin B$

$\because A \cup C = B \cup C \quad \therefore x_0 \in C$

$\because A \cap C = B \cap C \; and \; x_0 \in A \; and \; x_0 \in C$

$\therefore x_0 \in A \cap C \Rightarrow x_0 \in B \cap C \Rightarrow x_0 \in B$

So, the suppose is not right, and the original proposition is right.

54. Find $A_1 \subseteq A_2 \subseteq A_3 \ldots$

a) $\bigcup_{i=1}^{n} A_i = A_n = \{\ldots, -2, -1, 0, 1, \ldots, n\}$

b) $\bigcap_{i=1}^{n} A_i = A_1 = \{\ldots, -2, -1, 0, 1\}$

58. a) 00 1110 0000

b) 10 1001 0001

c) 01 1100 1110

62. $(A - B) \cup (B - A)$
$(x \in A \ but \ x \notin B) \ or \ (x \in B \ but \ x \notin A)$