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$$(3). B = \{0, 1, 2, 3, 4, 5, 6, 7\}.$$

$$C = \{0, 3, 6, 9, 12, 15, 18\}.$$

$$D = \{1, 2, 4, 8, 16, 32\}.$$

$$(3). B - (A \cup C) = \{0, 1, 2, 3, 4, 5, 6, 7\} - \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 15, 18\}$$

$$= \{4, 5\}.$$

$$(4). (B - A) \cup D = \{0, 3, 4, 5, 6, 7\} \cup \{1, 2, 4, 8, 16, 32\} = \{0, 1, 2, 3, 4, 5, 6, 8, 16, 32\}.$$

$$(14). (1) \overline{A \cap B} = \{3, 4, \{3\}, \{4\}\}.$$

$$(2) \overline{A \cap B} = \{3\}$$

$$(15). P(\emptyset) = \{\emptyset\}. PP(\emptyset) = \{\emptyset, \{\emptyset\}\}.$$

$$PPP(\emptyset) = \{\emptyset, \{\emptyset\}, \{\{\emptyset\}\}, \{\emptyset, \{\emptyset\}\}\}.$$

$$(1) \cup \{PPP(\emptyset), PP(\emptyset), P(\emptyset), \emptyset\}.$$

$$= \{\emptyset, \{\emptyset\}, \{\{\emptyset\}\}, \{\emptyset, \{\emptyset\}\}\}.$$

$$(2) \cap \{PPP(\emptyset), PP(\emptyset), P(\emptyset), \emptyset\}$$

$$= \{\emptyset\}.$$

$$(16). (1) P(A) = \{\emptyset, \{x\}, \{y\}, \{x, y\}\}.$$

$$\cup P(A) = \{\{x\}, \{y\}, \{x, y\}\}.$$

$$(2) UA = \{\emptyset, \{x, y\}\}$$

$$P(UA) = \{\emptyset, \{x, y\}, \{\{x, y\}\}, \{\emptyset, \{x, y\}\}\}.$$

$$(17). (1) (A - B) - C = A \cap (-B \cap -C) = A \cap -(B \cup C) = A - (B \cup C).$$

$$(2) (A - B) - C = A \cap -B \cap -C \cap -C = (A - C) \cap (-B \cap -C) = (A - C) \cap -(B \cup C).$$

$$(2). (A - C) - (B - C)$$

$$= A \cap -C \cap -(B \cap -C).$$

$$= A \cap -C \cap (-B \cup C).$$

$$= (A \cap -C \cap -B) \cup (A \cap -C \cap C).$$

$$= A - B - C.$$

$$(3). A = B \Leftrightarrow (A - B) = (B - A) = \emptyset.$$

$$\Leftrightarrow (A - B) \cup (B - A) = \emptyset \Leftrightarrow A \oplus B = \emptyset$$

$$(4). A \oplus B = \emptyset \Leftrightarrow A = B$$

$$(4) \Rightarrow: (A \subseteq C) \wedge (B \subseteq C) \Rightarrow (A \cup B) \subseteq (C \cup C) = C.$$

$$\Leftarrow: (A \cup B) \subseteq C \Rightarrow (A \subseteq C) \wedge (B \subseteq C).$$

$$(\forall x)(x \in A) \Rightarrow (\forall x)(x \in A \cup B) \Rightarrow (\forall x)(x \in C)$$

$$\therefore A \subseteq C. \text{ 同理 } B \subseteq C.$$

$$\therefore (A \cup B) \subseteq C \Rightarrow (A \subseteq C) \wedge (B \subseteq C)$$

$$(5) \Rightarrow: C \subseteq A \wedge C \subseteq B \Rightarrow (C \cap C) \subseteq (A \cap B) \Rightarrow C \subseteq (A \cap B).$$

$$\Leftarrow: \text{ 设 } C \subseteq (A \cap B).$$

$$(\forall x)(x \in C) \Rightarrow (\forall x)(x \in A \cap B) \Leftrightarrow (\forall x)(x \in A \wedge x \in B)$$

$$\Rightarrow (\forall x)(x \in A). \therefore C \subseteq A.$$

$$\text{同理 } C \subseteq B. \therefore C \subseteq (A \cap B) \Leftrightarrow (C \subseteq A) \wedge (C \subseteq B)$$

$$(16). \text{ 设 } A \cap B = \emptyset. (x \in A - \emptyset)$$

$$(\forall x)(x \in A) \Leftrightarrow (\forall x)(x \in A - \emptyset) \Leftrightarrow (\forall x)(x \in A - A \cap B)$$

$$\Rightarrow (\forall x)(x \in A - A \cap B) \Rightarrow (\forall x)(x \in -B). \therefore A \subseteq -B$$

$$\text{设 } A \subseteq -B.$$

$$(\forall x)(x \in A) \Leftrightarrow (\forall x)(x \in -B) \Rightarrow (\forall x)(x \notin B).$$

$$\Leftrightarrow (\forall x)(x \in -A). \therefore B \subseteq -A$$

$$\text{设 } B \subseteq -A.$$

$$(\forall x)(x \in A) \Leftrightarrow (\forall x)(x \notin -A) \Rightarrow (\forall x)(x \notin B).$$

$$\Leftrightarrow (\forall x)(x \notin A \cap B).$$

$$\therefore A \cap B = \emptyset. \therefore A \cap B = \emptyset \Leftrightarrow A \subseteq -B \Leftrightarrow B \subseteq -A$$



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(8. (1).  $\neg(A-B)=B$

$\therefore A \cap B = B. \therefore A \cap B = B \cap B$

$\therefore B = A - B = \emptyset. A = B = \emptyset.$

(2).  $A-B = B-A. A-B = (B-A) \cap (A-B) \neq \emptyset$

$\therefore A-B = B-A = \emptyset = A \cap B = B \cap A.$

$\therefore A = B.$

(3).  $A=B$  (4).  $B=\emptyset$

(9. (1)  $(A-B) \cup (A-C)$

$= (A \cap B) \cup (A \cap C)$

$= A \cap (A \cup B) \cap (A \cup C) \cap (\neg B \cup \neg C) = A.$

$\therefore \begin{cases} A \cup B \supseteq A \\ A \cup C \supseteq A \Leftrightarrow A \subseteq \neg(B \cap C). \\ \neg B \cup \neg C \supseteq A. \end{cases}$

(2).  $(A-B) \cup (A-C) \neq \emptyset.$

$= A \cap (A \cup B) \cap (A \cup C) \cap (\neg B \cup \neg C) \neq \emptyset$

$\Leftrightarrow A-B \neq \emptyset \text{ 且 } A-C \neq \emptyset.$

$\therefore A \subseteq B \wedge A \subseteq C \Leftrightarrow A \subseteq B \cap C.$

(3).  $(A-B) \cap (A-C).$

$= A \cap B \cap C = \emptyset.$

$\Leftrightarrow A \subseteq \neg(B \cap C) = B \cup C.$

(4).  $(A-B) \oplus (A-C) = \emptyset$

$\Leftrightarrow A-B = A-C.$

10. (1).  $A \times B = \emptyset$

$\Rightarrow \{ \langle x, y \rangle \mid x \in A, y \in B \} = \emptyset.$

$\therefore A = \emptyset \text{ 或 } B = \emptyset.$

(2).  $\exists A = \emptyset \text{ 或 } A = A \times A.$

$A \neq \emptyset \text{ 或 } A \neq A \times A.$

28. ~~设  $A = \{x \mid 2 \leq x \leq 100 \wedge x \geq 1 \wedge$~~

~~设  $A = \{x \mid 2 \leq x \leq 100 \wedge x \geq 1 \wedge$~~

$B = \{x \mid 3 \leq x \leq 100 \wedge x \geq 1 \wedge$

$C = \{x \mid 5 \leq x \leq 100 \wedge x \geq 1 \wedge$

$|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |A \cap C|$

$- |B \cap C| + |A \cap B \cap C|.$

$= 100 + 83 + 50 - 41 - 25 - 16 + 8 = 189$