

集合

2

$$(2) S_2 = \{2, 5\}$$

4

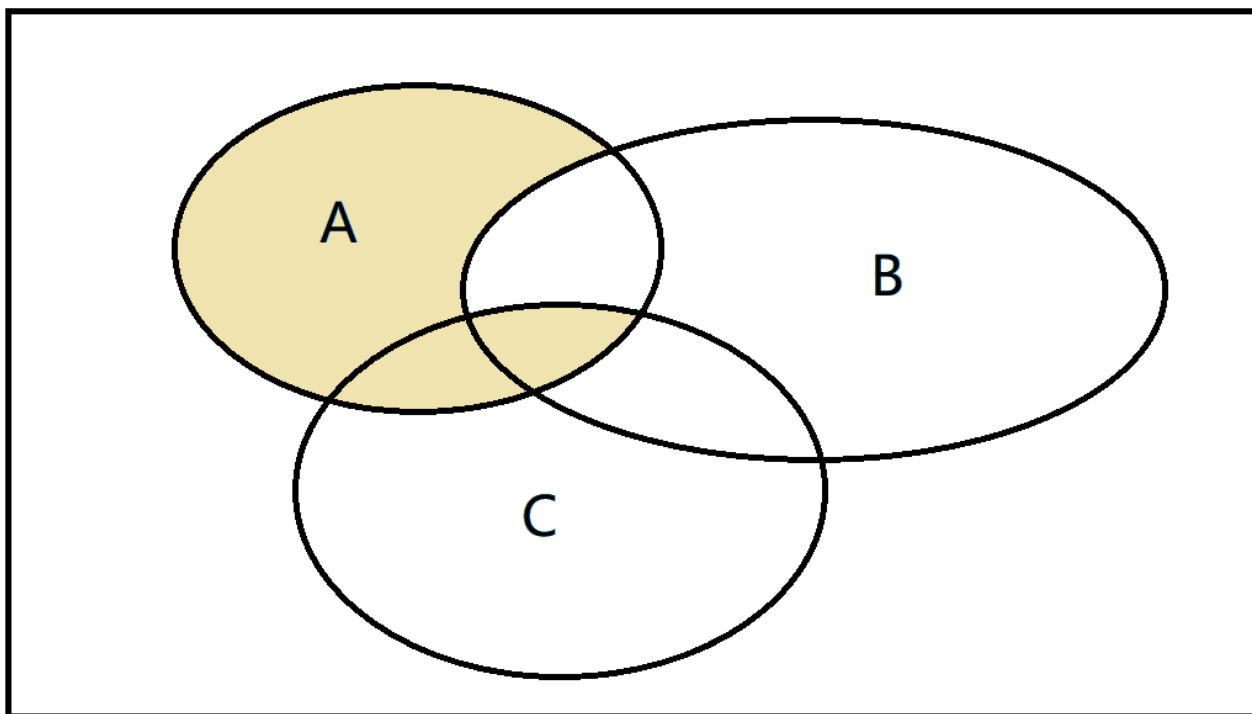
$$(2) P(A) = \{\{\emptyset\}, \{1\}, \{\{2, 3\}\}, \{1, \{2, 3\}\}\}$$

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$$\begin{aligned} (2) \quad & ((A \cup B \cup C) - (B \cup C)) \cup A = ((A \cup B \cup C) \cap \sim(B \cup C)) \cup A \\ & = (A \cup B \cup C \cap A) \cap ((\sim B \cap \sim C) \cup A) \\ & = (A \cup B \cup C) \cap ((\sim B \cup A) \cap (\sim C \cup A)) \\ & = (A \cup ((B \cup C) \cap \sim B)) \cap (\sim C \cup A) \\ & = (A \cup ((B \cap \sim B) \cup (C \cap \sim B))) \cap (\sim C \cup A) \\ & = (A \cup (C \cap \sim B)) \cap (\sim C \cup A) \\ & = A \cup ((C \cap \sim B) \cap \sim C) \\ & = A \end{aligned}$$

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$$(3) A \cap (\sim B \cup C)$$



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$A = \{x \mid \text{读《每周新闻》的人}\}$ $B = \{x \mid \text{读《时代》杂志的人}\}$ $C = \{x \mid \text{读《幸运》杂志的人}\}$

$E = \{x \mid \text{所有被调查的人}\}$

已知:

$$|E| = 60; |A| = 25; |B| = 26; |C| = 26; |A \cap C| = 9; |A \cap B| = 11; |B \cap C| = 8; |E - (A \cup B \cup C)| = 8;$$

(1) 求全部阅读三种杂志的人: $|A \cap B \cap C|$

$$\text{已知: } |A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |A \cap C| - |B \cap C| + |A \cap B \cap C| = 25 + 26 + 26 - 9 - 11 - 8 + |A \cap B \cap C| = 60 - 8$$

$$|A \cap B \cap C| = 3$$

(2) 求仅阅读...的人数

$$|A - B - C| = |A \cap \sim B \cap \sim C| = |A \cap (E - (B \cup C))| = |(A \cap E) - (A \cap (B \cup C))| = |A - (A \cap B) \cup (A \cap C)| = |A| - |(A \cap B) \cup (A \cap C)| = |A| - (|A \cap B| + |A \cap C| - |A \cap B \cap C|) = 25 - (11 + 9 - 3) = 8$$

同理

$$|B - A - C| = |B| - (|A \cap B| + |B \cap C| - |A \cap B \cap C|) = 26 - (11 + 8 - 3) = 10$$

$$|C - B - A| = |C| - (|A \cap C| + |B \cap C| - |A \cap B \cap C|) = 26 - (9 + 8 - 3) = 12$$

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(2) 证明: $(A - B) - C = (A - C) - (B - C)$

1. 公式法

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

$$= (A \cap \sim C) \cap (\sim B \cup C) \text{ (德摩根律)}$$

$$=((A \cap \sim C) \cap C) \cup ((A \cap \sim C) \cap \sim B) \text{ (} \cup \cap \text{ 的分配律)}$$

$$=\emptyset \cup ((A \cap \sim C) \cap \sim B) \text{ (零律)}$$

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

$$=(A-B)-C$$

2. 基本定义法

$$x \in (A-C) \wedge x \notin (B-C)$$

$$\Leftrightarrow x \in A \wedge x \notin C \wedge \neg (x \in B \wedge x \notin C)$$

$$\Leftrightarrow x \in A \wedge x \notin C \wedge (x \notin B \vee x \in C) \text{ (德摩根律)}$$

$$\Leftrightarrow (x \in A \wedge x \notin C \wedge x \notin B) \vee (x \in A \wedge x \notin C \wedge x \in C) \text{ (} \vee \wedge \text{ 的分配律)}$$

$$\Leftrightarrow (x \in A \wedge x \notin C \wedge x \notin B) \vee \emptyset \text{ (零律)}$$

$$\Leftrightarrow (x \in A \wedge x \notin B) \wedge x \notin C \text{ (} \wedge \text{ 的结合律)}$$

$$\Leftrightarrow x \in (A \cap \sim B) \wedge x \notin C$$

$$\Leftrightarrow x \in ((A \cap \sim B) \cap \sim C)$$

$$\Leftrightarrow x \text{ 属于 } (A-B)-C$$

13.

$$\text{证明: } C \subseteq A \wedge C \subseteq B \Leftrightarrow C \subseteq A \cap B$$

$$\forall x(x \in C \rightarrow x \in A) \wedge \forall x(x \in C \rightarrow x \in B) \text{ (根据基本定义)}$$

$$\Leftrightarrow \forall x((x \in C \rightarrow x \in A) \wedge (x \in C \rightarrow x \in B)) \text{ (量词分配等值式)}$$

$$\Leftrightarrow \forall x((\neg x \in C \vee x \in A) \wedge (\neg x \in C \vee x \in B)) \text{ (蕴含等值式)}$$

$$\Leftrightarrow \forall x(\neg x \in C \vee (x \in A \wedge x \in B)) \text{ (} \vee \wedge \text{ 的分配律)}$$

$$\Leftrightarrow \forall x(\neg x \in C \vee x \in (A \cap B)) \text{ (交集的基本定义)}$$

$$\Leftrightarrow \forall x(x \in C \rightarrow x \in (A \cap B)) \text{ (蕴含等值式)}$$

$$\Leftrightarrow C \subseteq (A \cap B) \text{ (子集的基本定义)}$$