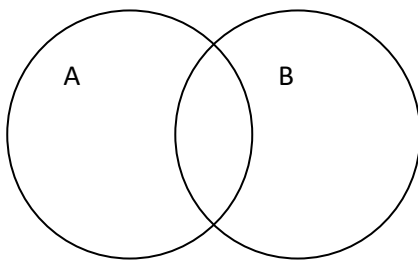


第八章 集合的运算

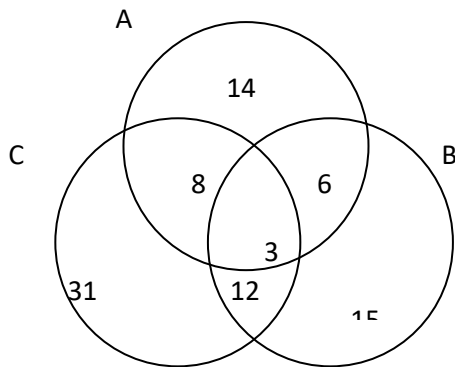
题型 1 联集



$A \cup B$

属于集合 A 和 B 的元素

例子



求

a. $n(A) = 14 + 8 + 3 + 6 = 31$

b. $n(B) = 6 + 3 + 12 + 15 = 36$

c. $n(C) = 8 + 3 + 31 + 12 = 54$

d. $n(A \cup B) = 14 + 8 + 3 + 6 + 12 + 15 = 58$

e. $n(A \cup C) = 14 + 8 + 3 + 6 + 31 + 12 = 74$

f. $n(B \cup C) = 31 + 12 + 8 + 3 + 6 + 15 = 75$

g. $n(A \cup B \cup C) = 14 + 8 + 3 + 6 + 12 + 15 + 31 = 89$

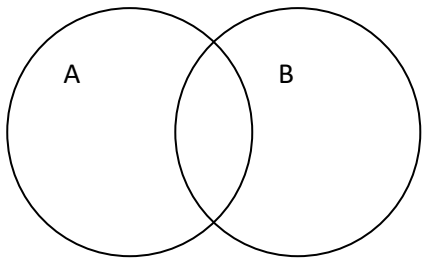
练习



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1. 已知 $S = \{1, 0, 2\}$, $R = \{1, 0, 4\}$ 求 $n(S \cup R)$
2. 设 $A = \{x \mid 1 \leq x \leq 5, x \in \mathbb{N}\}$, $B = \{x \mid 2 \leq x \leq 6, x \in \mathbb{N}\}$, 求 $A \cup B$ 和 $n(A \cup B)$
3. $\{x \mid x \text{ 是小于 } 15 \text{ 的质数}\} \cup \{x \mid x \text{ 是小于 } 10 \text{ 的合数}\} = ?$
4. 若 $\{3, x, 9\} \cup \{3, 18\} = \{3, 5, 9, 18\}$, 求 x
5. 若 $P = \{2, 3, 4, 5, 6\}$, 则 $Q = \{1, 3, 5\}$, 求 $P \cup Q$

题型 2 交集



$A \cap B$

同时属于集合 A 和 B 的元素

例子

$$A = \{a, e, i, o, u\}$$

$$B = \{a, i, r\}$$

$$C = \{d, a, r, e\}$$

试证

a. $A \cap B = B \cap A$

$$A \cap B = \{a, e, i, o, u\} \cap \{a, i, r\} = \{a, i\}$$

$$B \cap A = \{a, i, r\} \cap \{a, e, i, o, u\} = \{a, i\}$$

$$A \cap B = B \cap A$$

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

$$B \cap C = \{a, i, r\} \cap \{d, a, r, e\} = \{a, r\}$$

$$A \cap (B \cap C) = \{a, e, i, o, u\} \cap \{a, r\} = \{a\}$$

$$A \cap B = \{a, e, i, o, u\} \cap \{a, i, r\} = \{a, i\}$$

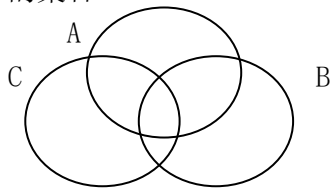
$$(A \cap B) \cap C = \{a, i\} \cap \{d, a, r, e\} = \{a\}$$

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

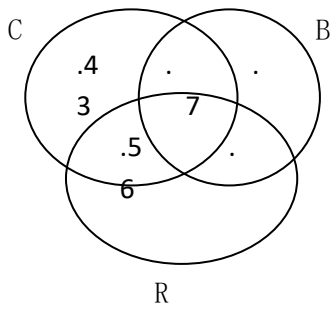
练习

1. 若 $x = \{x \mid 0 < x \leq 4\}$, $y = \{x \mid 2 < x \leq 6\}$, 则 $x \cap y = ?$

2. 写出阴影部分的集合



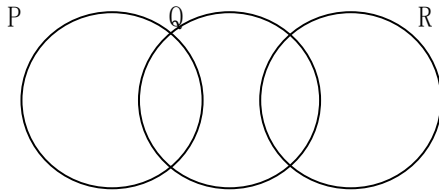
3. 写出阴影部分的集合



求 $P \cup (R \cap Q)$

4. 若 $\{5, 7, x, 9, 10\} \cap \{y, 7, 4, 2, 12\} = \{4, 7, 9\}$, 求 x 与 y

5. 求阴影的部分

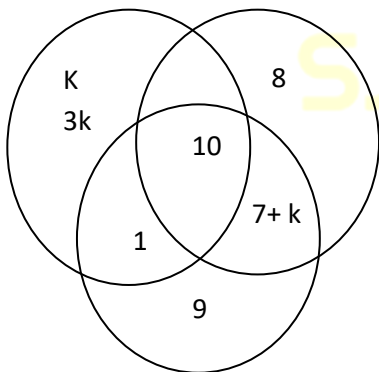


6. 若 $A = \{0, 1, 3, 4\}$, $B = \{3, 4, x\}$ 且 $A \cap B = \{3, 4\}$ 求 x

7. 若 $A = \{x \mid x < 4, x \in \mathbb{N}\}$, $B = \{x \mid x \geq 1, x \in \mathbb{N}\}$, 则 $n(A \cap B) = ?$

8. 若 $A \subset B$ 及 $B \subset C$, 则 $A \subset C = ?$

9. 若 $n(A) = n(B \cap C)$, $k = ?$



10. 若 $\{3, 1, 9, 8, 6\} \cap \{8, 4, 5, 7, b\} = \{4, 6, 8\}$, 求 $a - b$ 值

11. 设 $A = \{x \mid x \text{ 是小于 } 15 \text{ 的正奇数}\}$, $B = \{x \mid x \text{ 是小于 } 15 \text{ 的三倍数}\}$, 求 $A \cup B$ 与 $A \cap B$

12. 设 $A = \{2^n \mid n \text{ 是小于 } 5 \text{ 的自然数}\}$, $B = \{2^n \mid n \text{ 是小于 } 10 \text{ 的自然数}\}$, 求 $A \cup B$ 与 $A \cap B$

题型 3 差集

例子 $A = \{1, 2, 3, 4, 5\}$

$B = \{2, 4\}$

求 $A \setminus B$

$= \{1, 2, 3, 4, 5\} \setminus \{2, 4\} = \{1, 3, 5\}$

练习

1. 设 $A = \{1, 2, 3, 4, 5\}$

$$B = \{ 2, 4, 6 \}$$

$$C = \{ 3, 4, 5 \}$$

求

a. $B \setminus C$

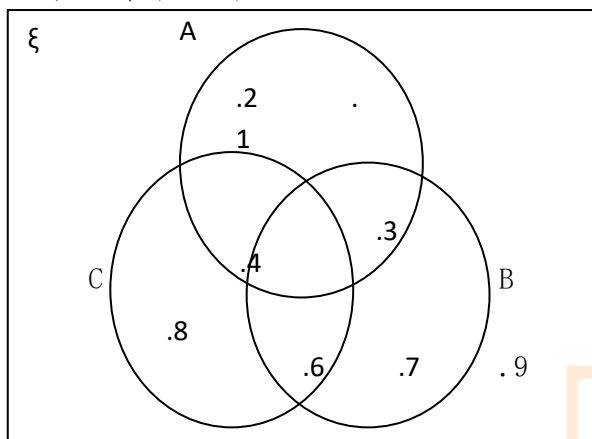
b. $A \setminus C$

c. $C \setminus A$

2. 设 $A = \{ x \mid x \text{ 是质数} \}$ $B = \{ x \mid x \text{ 是偶数} \}$ 求 $A \setminus B$

3. 设 $A = \{ x \mid 1 \leq x \leq 5, x \in \mathbb{N} \}$, $B = \{ x \mid x < 5, x \in \mathbb{N} \}$, 求 $A \setminus B$ 及 $n(A \setminus B)$

4. 求 $A \setminus (B \cap C)$



5. 已知泛集 $\{ a, b, c, d, e, f, g, h, i, j, k \}$

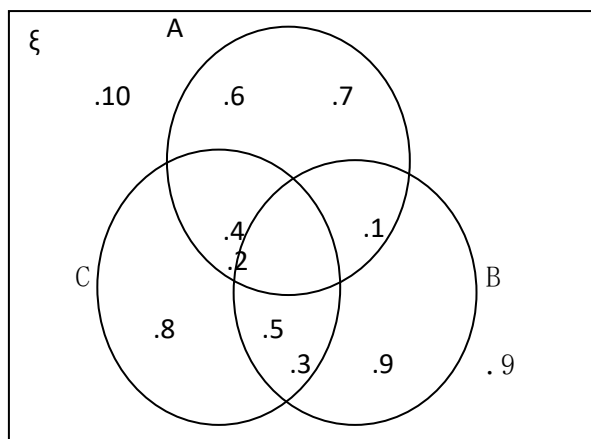
$$A = \{ a, b, c, d \}$$

$$B = \{ c, d, e, f, g, h \}$$

$$C = \{ b, d, f, h, j \}$$

求 $(A \setminus B) \setminus C$

6. 求 $n[(A \cup B) \setminus C]$



7. 若 $\{ 2, 3, 4, 7 \} \setminus \{ 2, 4, 5, 7, x \} = \emptyset$, $x = ?$

8. 已知 $n(A) = 7$, $n(B) = 6$, $n(A \setminus B) = 4$ 求 $n(B \setminus A)$

9. 若 $\{ 11, 5, x-y, 12, 8 \} \setminus \{ 5, 8, 12 \} = \{ x+y, 7 \}$ 求 x 与 y 的值

10. 若 $P = \{ x \mid x \text{ 为质数, 且 } x < 15 \}$, $Q = \{ x \mid x \text{ 为 } 585 \text{ 的质因数} \}$, 求 $P \setminus Q$

题型 4 泛集、余集

泛集：所讨论的集合

余集：要求的集合“的外面”如， A'

例如：

$$\xi = \{0, 1, 2, 3, 4, 5, 6\}$$

$$A = \{1, 3, 5\}$$

$$A' = \{0, 2, 4, 6\}$$

练习

1. 若 $\xi = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$

$$A = \{1, 2, 3, 4\}$$

$$B = \{2, 4, 6, 8\}$$

$$C = \{3, 4, 5, 6\}$$

求

a. A'

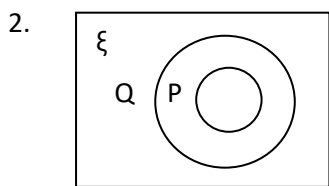
b. B'

c. C'

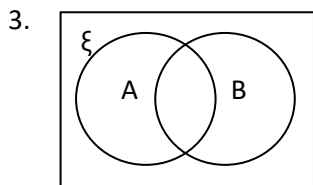
d. $(A \cap C)'$

e. $(A \cap B)'$

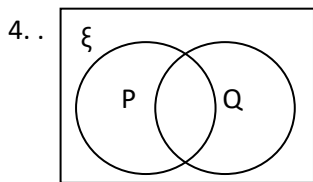
f. $(B \setminus C)'$



阴影部分表示什么？



阴影部分表示什么？



阴影部分表示什么？

5. 若 $\xi = \{1, 2, 3, 4, 5, 6, 7, 8\}$

$A = \{2, 3, 5, 7\}$

$B = \{2, 4, 5, 8\}$

则 $A' \cup B' =$



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