3 (1) $(A \cap B) \times (C \cap D)$

任取 $\langle x, y \rangle$

$\Leftrightarrow$ $x \in A \wedge x \in B \wedge y \in C \wedge y \in D$

$\Leftrightarrow$ $x \in A \wedge y \in C \wedge x \in B \wedge y \in D$

$\Leftrightarrow$ $(\langle x, y \rangle \in A \times C) \wedge (\langle x, y \rangle \in B \times D)$

$\Leftrightarrow$ $(A \times C) \cap (B \times D)$

14解. ①不成立 $A = \{1\}$ $B = \{2\}$ $C = \{3\}$ $D = \{4\}$

$(A \cup B) \times (C \cup D) = \{\langle 1, 3 \rangle, \langle 1, 4 \rangle, \langle 2, 3 \rangle, \langle 2, 4 \rangle\}$

$(A \times C) \cup (B \times D) = \{\langle 1, 3 \rangle, \langle 2, 4 \rangle\} \neq (A \cup B) \times (C \cup D)$

②成立 任取 $\langle x, y \rangle \in (A - B) \times (C - D)$

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

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

$\Leftrightarrow$ $(A \times C) - (B \times D)$

11解 $R_1(0) = \{1, 2, 3, 4\}$

$R_1(1) = \{2, 3, 4\}$

$R_2(0) = \{1, 0\}$

$R_2(1) = \{-2, 1\}$

$R_3(3) = \phi$

14. $R \circ R = \{\langle 0, 2 \rangle, \langle 0, 3 \rangle, \langle 1, 3 \rangle\}$

$R^{-1} = \{\langle 1, 0 \rangle, \langle 2, 0 \rangle, \langle 3, 0 \rangle, \langle 2, 1 \rangle, \langle 3, 1 \rangle, \langle 3, 2 \rangle\}$

$R \uparrow \{0, 1\} = \{\langle 0, 1 \rangle, \langle 0, 2 \rangle, \langle 0, 3 \rangle, \langle 1, 2 \rangle, \langle 1, 3 \rangle\}$

$R[\{1, 2\}] = \{2, 3\}$

17 $R_1 = \{\langle x, y \rangle \mid x, y \in A \text{ 且 } x \neq y\}$

$R_2 = \{\langle x, y \rangle \mid x, y \in A \text{ 且 } x + y = 2\}$

19

19 7.5(2)

任取 y 有 y∈F[A∪B]

⟺ ∃x (⟨x,y⟩∈F ∧ x∈A∪B)

⟺ ∃x (⟨x,y⟩∈F ∧ x∈A) ∨ ∃x (⟨x,y⟩∈F ∧ x∈B)

⟺ y∈F[A] ∪ y∈F[B]

⟺ y ∈ F[A] ∪ F[B]

(3) 任取 ⟨x,y⟩ 有 ⟨x,y⟩∈F↾(A∩B)

⟺ (⟨x,y⟩∈F ∧ x∈A∩B)

⟺ (⟨x,y⟩∈F ∧ x∈A) ∧ (⟨x,y⟩∈F ∧ x∈B)

⟺ F↾A ∩ F↾B