

1. .
- 1.1. .
- 1.2. .
- 1.3. .
- 1.4. .
- 1.5. .
- 1.6. .
- 1.7. .
- 1.8. .
- 1.9. .
- 1.10. .
- 1.11. .
- 1.12. .
- 1.13. .
- 1.14. .
- 1.15. .
- 1.16. .
- 1.17. .

1.

1. ,

$$(t_1, t_2, t_3, \dots, t_n),$$

$$t_1 < t_2 < t_3 < \dots < t_n.$$

$$R_1 = \{(t_i, t_j) \mid t_i < t_j \quad i < j\}$$

$$R_2 = \{(t_j, t_i) \mid t_j > t_i \quad j > i\}$$
2. « » « » : (1,2,...5),

$$1 < 2 < \dots < 5.$$

$$A = \{a_0, a_1, a_2, \dots, a_i, \dots, a_j, \dots, a_n\},$$

$$a_0 < a_1 < a_2 < \dots < a_i < \dots < a_j < \dots < a_n.$$

$$\langle \rangle \quad \langle \rangle$$

$$R, \quad A \times A.$$

$$R_1 = \{(a_i, a_j) \mid a_i < a_j \quad i < j\}$$

$$R_2 = \{(a_j, a_i) \mid a_j > a_i \quad j > i\}$$

3. \subseteq , $A \subseteq$

$$A.$$

$$A = \{A_0, A_1, \dots, A_i, \dots, A_j, \dots, A_n\}.$$

$$A_0 \subseteq A_1 \subseteq \dots \subseteq A_i \subseteq \dots \subseteq A_j \subseteq \dots \subseteq A_n$$

$$A_0 \subset A_1 \subset \dots \subset A_i \subset \dots \subset A_j \subset \dots \subset A_n.$$

$$R, A \times A.$$

$$R_1 = \{(A_i, A_j) \mid A_i \subseteq A_j \quad i < j\}$$

$$R_2 = \{(A_i, A_j) \mid A_i \subset A_j \quad i < j\}$$

, , .

- A :
- ;
- .

- R :
- A , :
- , . . $xRy \quad x \neq y$.
- , . ., $xRy \quad yRx, \quad x = y$.
- , . ., $xRy \quad yRz, \quad xRz$.

- R :
- A , :
- , . ., xRx .
- , . ., $xRy \quad yRx, \quad x = y$
- , . ., $xRy \quad yRz, \quad xRz$.

1. « \leq »
« \leq »
, $a \leq b$, , a b a b .

2. .
 a b , $a < b$, a b
 a b .

• ,

«≤»

«<»

,

«⋈»

«⋈».

R^n

1. «≤» «≥»

$$(a_1, \dots, a_{i-1}, a_i, a_{i+1}, \dots, a_n) \leq (b_1, \dots, b_{i-1}, b_i, b_{i+1}, \dots, b_n)$$

$$a_1 \leq b_1, \dots, a_{i-1} \leq b_{i-1}, a_i \leq b_i, a_{i+1} \leq b_{i+1}, \dots, a_n \leq b_n$$

2. «<» «>»

$$(a_1, \dots, a_{i-1}, a_i, a_{i+1}, \dots, a_n) < (b_1, \dots, b_{i-1}, b_i, b_{i+1}, \dots, b_n)$$

$$a_1 < b_1, \dots, a_{i-1} < b_{i-1}, a_i < b_i, a_{i+1} < b_{i+1}, \dots, a_n < b_n$$

,

$$a_i < b_i$$

, . . .

$$(a_1, \dots, a_{i-1}, a_i, a_{i+1}, \dots, a_n) < (b_1, \dots, b_{i-1}, b_i, b_{i+1}, \dots, b_n)$$

$$a_1 \leq b_1, \dots, a_{i-1} \leq b_{i-1}, a_i < b_i, a_{i+1} \leq b_{i+1}, \dots, a_n \leq b_n$$

$$(5, 1, -3) < (5, 2, -3); (5, 3, -3) \quad (5, 0, 0) -$$

:

1.

2.

3.

4.

.

X

«≤»

,

:

- 1) : $a \leq a$;
- 2) : $a \leq b \leq a \Rightarrow a = b$ (a, b, X).
- 3) : $a \leq b \leq c \Rightarrow a \leq c$;

«<» , :

- 1) : $a < b \Rightarrow a \neq b$;
- 2) : $a < b \wedge b < a \Rightarrow a = b$
- 3) : $a \leq b \leq c \Rightarrow a \leq c$;

• a b
 $a < b, a = b, a > b.$ $<, = >$

•
 (). X
 , , .

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 X , ,

•
 R X
 $a \in X, b \in X$ ($aRb, bRa.$ X R ,

• —

•
 , .

— ,
 .

1. X - $a < b$ X $c \in X$
 $a < c < b$ (a b), $a < b$

2. a b $b.$
 b $a.$

• , ,
 .

3.

$$a < b, \quad ; \quad .$$

4.

$$a < b \quad \begin{matrix} A \\ X \end{matrix} \quad X \quad X, \quad A.$$

5.

$$\sup. \quad ,$$

6.

$$\inf. \quad ,$$

7.

$$, \quad .$$

$$\cdot \quad , \quad .$$

$$\cdot \quad N \quad .$$

$$\cdot \quad .$$

$$(\quad X \quad , \quad .$$

$$\cdot \quad R \quad X \quad a \in X, \quad b \in X$$

$$aRb, \quad bRa.$$

$$R \quad X$$

,

$$- \forall a(aRa),$$

$$- \forall a,b(aRb) \wedge (bRa) \Rightarrow a = b,$$

$$- \forall a,b,c(aRb) \wedge (bRc) \Rightarrow aRc.$$

$$R \quad X$$

,

$$- \forall a,b(aRb) \Rightarrow a \neq b,$$

$$- \forall a,b(aRb) \wedge (bRa) \Rightarrow a = b,$$

$$\forall a,b,c(aRb) \wedge (bRc) \Rightarrow aRc.$$

$$1. \quad :$$

$$1. \quad 30.$$

$$T = \{1,2,3,5,6,10,15,30\}.$$

$$2. \quad \ll \leq \gg, \quad m \quad n: \quad m \leq n$$

$$\begin{array}{l} n=15 \quad m=5. \quad n \quad m - \\ n=6 \quad m=5. \quad n \quad m - \end{array}, \quad \begin{array}{l} 5 \quad 15 \\ 5 \quad 6 \end{array}.$$

$$1.$$

$$2.$$

.

$$A. \quad , \quad A$$

$$A_1, A_2, A_3, \dots A_m, \quad :$$

$$1. A_i \neq \emptyset, \quad (i=1,2,\dots,m);$$

$$2. A_i \cap A_j = \emptyset, \quad i \neq j \quad i, j \in \{1,2,3,\dots,m\};$$

$$3. A = \bigcup_{i=1}^m A_i$$

$$A$$

.

$$A$$

$$m$$

,

$$A$$

.

$$(\quad)$$

$$A.$$

X

$a \in X$, $\langle \langle \rangle \rangle$ $x \in X$ $\langle \leq \rangle$ $x < a$ $x \leq a$.

.

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.

a' . x $x \leq a$ $x \leq a'$. $a \leq a'$

,

$(aRa') \wedge (a'Ra)$ $a = a'$.
 $a = a'$,

,

.

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$X = \{1, 2, 15, 18\}$,

$a \leq b$.

:

1.

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2.

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.

X :

1) $1 \geq 1, 1 \not\geq 2, 1 \not\geq 15, 1 \not\geq 18$.

2) $2 \geq 1, 2 \geq 2, 2 \not\geq 15, 2 \not\geq 18$.

3) $15 \geq 1, 15 \geq 2, 15 \geq 15, 15 \not\geq 18$.

4) $18 \geq 1, 18 \geq 2, 18 \geq 15, 18 \geq 18$.

18.

X

$a \in X$, $\langle \langle \rangle \rangle$ $\langle \leq \rangle$:

- $x < a$ $x \leq a$,

- a x — .

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— ,

X

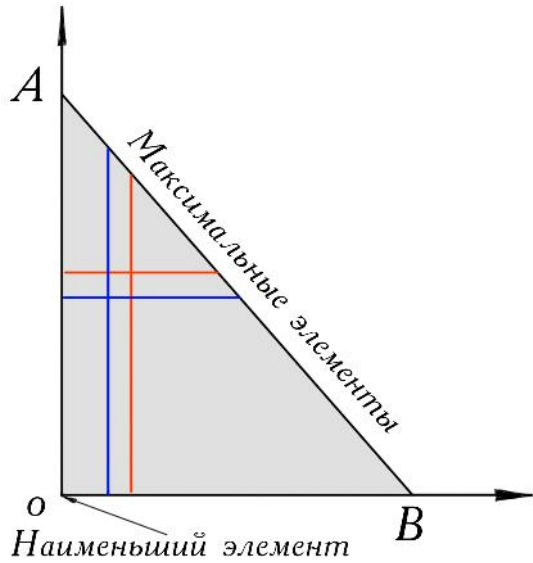
$$a \in X, \quad \langle\langle \rangle\rangle \quad x \in X \quad \langle\langle \leq \rangle\rangle \quad a < x \quad a \leq x.$$

X

- $a \in X,$
- $a < x \quad a \leq x,$
- $a \quad x -$

• ,

$$\cdot \quad X \quad OAB \quad (a,b) \leq (c,d) \quad a \leq c \quad b \leq d.$$



(0,0)

$X -$

AB $OAB.$ X ,

X .

$$A \qquad B \subseteq A, \qquad a \in A$$

$$B, \qquad b \in B$$

$$b \leq a.$$

$$A = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}, B = \{1, 2, 3, 4, 5\}. \qquad : 6, 7, 8, 9$$

$$A \qquad B \subseteq A, \qquad a \in A$$

$$B, \qquad b \in B$$

$$a \leq b.$$

$$A = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}, B = \{5, 6, 7, 8, 9\}. \qquad : 1, 2, 3, 4$$

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

$$a \in A \qquad , \qquad a = \min_i a_i,$$

$$a_i - \qquad B. \ a = \min \{6, 7, 8, 9\} = 6$$

$$a$$

$$\sup B.$$

$$A = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}, B = \{1, 2, 3, 4, 5\}. \quad \sup B = 6$$

$$,$$

$$,$$

$$.$$

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

$$a \in A \qquad , \qquad a = \max_i a_i,$$

$$a_i - \qquad B.$$

$$a = \max \{1, 2, 3, 4\} = 4$$

$$\inf B.$$

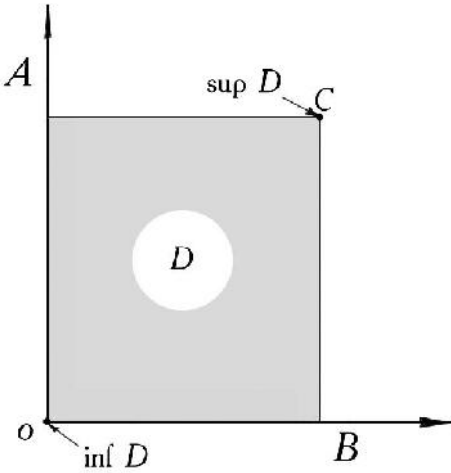
$$A = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}, B = \{5, 6, 7, 8, 9\}. \quad \inf B = 4.$$

$$,$$

$$,$$

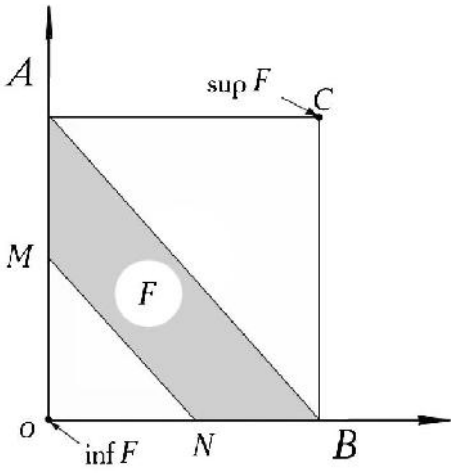
$$.$$

\cdot D $OACB$
 $:$
 $(a,b) \leq (c,d)$ $a \leq c \quad b \leq d.$



O
 C
 \cdot $\inf D \in D.$
 $\sup D \in D.$
 $D.$

\cdot F $ABNM$
 $:$ $(a,b) \leq (c,d)$ $a \leq c \quad b \leq d.$



\cdot $\inf F.$ $\sup F$
 $F.$

\cdot R
 \cdot (\quad)
 \cdot X
 $aRb,$ $a,$
 $b.$ $, a \in X, b \in X$

$$aRc \quad cRb. \qquad (\qquad), \qquad aRb \qquad c \in X \qquad ,$$

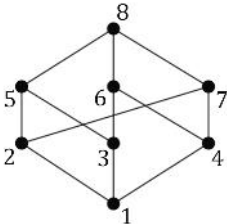
$$\qquad . \qquad X = \{1,2,3,4,5,6,7,8\},$$

$$R = \{(1,2),(1,3),(1,4),(\mathbf{1},\mathbf{5}),(\mathbf{1},\mathbf{6}),(\mathbf{1},\mathbf{7}),(\mathbf{1},\mathbf{8}),$$

$$(2,5),(2,7),(\mathbf{2},\mathbf{8}), (3,5),(3,6),(\mathbf{3},\mathbf{8}), (4,6),(4,7),(\mathbf{4},\mathbf{8}),$$

$$(5,8),(6,8),(7,8)\}$$

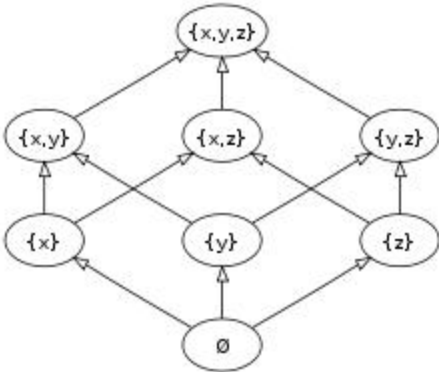
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$$C=\{x,y,z\}, \quad X - \qquad \qquad \qquad :$$

$$X=\{\emptyset,\{x\},\{y\},\{z\},\{x,y\},\{y,z\},\{z,x\},\{z,y,z\}\}$$



$$\qquad R \qquad X$$

$$(T,V) \in R, \qquad T \subseteq V.$$

$$, \quad (\{y\},\{x,y\}) \in R,$$

$$\{y\} \subseteq \{x,y\}. \qquad (\{y,z\},\{z\}) \notin R,$$

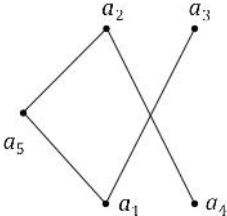
$$\{y,z\} \not\subset \{z\}.$$

$$R, \qquad , \qquad (X,R) - \quad - \qquad .$$

.

,

$$R = \{(a_1,a_2),(a_1,a_3),(a_1,a_5),(a_4,a_2),(a_5,a_2)\}.$$



$$\qquad ,$$

$$(\qquad ,$$

$$).$$