9.09. ±.
위상수학 리지 | 1장.

PAGE
DATE

#1.1.1(a). $A = \{1, 2, 3\}$.

(b) $-5 < x < 5$.

$B = \{0, -4, -3, -2, -1, \cup, 1, 2, 3, 4\}$.

(c). $x = \frac{-(3) \pm \sqrt{9 - 4 \cdot 1 \cdot (-1)}}{2}$

$= \frac{-3 \pm \sqrt{13}}{2}$

$C = \{\frac{-3-\sqrt{13}}{2}, \frac{-3+\sqrt{13}}{2}\}$.

#1.1.2.(a) $A = \{x \in \mathbb{N} \mid x \leq 5\}$.

(b). $B = \{x \in \mathbb{N} \mid x = 2n, n \in \mathbb{N}\}$.

(c). $(x - 1 + \sqrt{2})(x - 1 - \sqrt{2}) = 0$.

$x^2 + (-1+\sqrt{2}-1-\sqrt{2})x + (1-2) = 0$.

$x^2 - 2x - 1 = 0$.

$C = \{x \in \mathbb{R} \mid x^2 - 2x - 1 = 0\}$.

YANGJI

PAGE
DATE

#1.1.3(b) $P(B) = \{\{a\}, \{\{b,c\}\}, \{a, \{b,c\}\}, \emptyset\}$

(a) $C = P(\{a,b\}) =$

$= \{\emptyset, \{\{a,b\}\}, \ldots$

$P(C) = \{\emptyset, \{\emptyset\}, \{\{\{a,b\}\}\}, \{\emptyset, \{\{a,b\}\}\}, \ldots$

#1.2.3(a) $A \cap B = B \cap A$.

$x \in (A \cap B)$.
$\leftrightarrow x \in A$ and $x \in B$.
$\leftrightarrow x \in B$ and $x \in A$.
$\leftrightarrow x \in (B \cap A)$.

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

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

$x \in A \cap (B \cap C)$
$\leftrightarrow x \in A$ and $x \in B \cap C$.
$\leftrightarrow x \in A$ and ($x \in B$ and $x \in C$).
$\leftrightarrow (x \in A$ and $x \in B)$ and $(x \in C)$.
$\leftrightarrow x \in (A \cap B)$ and $x \in C$.
$\leftrightarrow x \in (A \cap B) \cap C$

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

PAGE
DATE

(c). $x \in A \cap (B \cup C)$

$\leftrightarrow x \in A$ and $(x \in B$ or $x \in C)$

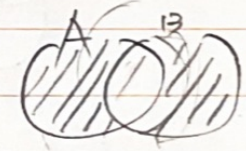
$\leftrightarrow (x \in A$ and $x \in B)$ or $(x \in A$ and $x \in C)$

$\leftrightarrow x \in A \cap B$ or $x \in A \cap C$

$\leftrightarrow x \in (A \cap B) \cup (A \cap C)$.

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

(d) $(A \cap B)^c$.



$x \in (U - (A \cap B))$.

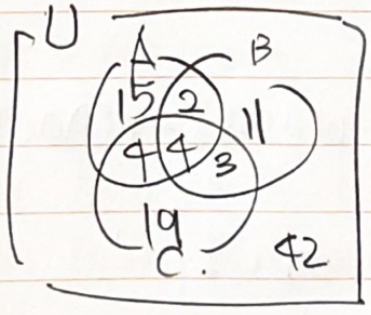
$\leftrightarrow x \notin (A \cap B)$

$\leftrightarrow x \notin A$ or $x \notin B$.

$\leftrightarrow \{x \mid x \in A^c \cup B^c\}$.

$\therefore (A \cap B)^c = A^c \cup B^c$.

#1.3.2 (a)



$100 = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(C \cap A)$
$+ n(A \cap B \cap C) + n((A \cup B \cup C)^c)$.

$= 25 + 20 + 30 - 6 - 7 - 8 + n(A \cap B \cap C) + 42$.

$58 = 95 - 21 + n(A \cap B \cap C)$. $n(A \cap B \cap C) = 4$

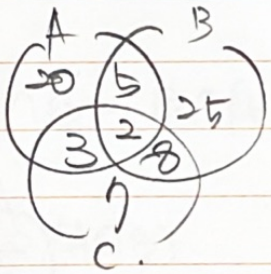
PAGE
DATE

$15+11+19=45$ (명) $\therefore$ 45명.

(b) $2+4+3=9$. $\therefore$ 9명.

(c) $n(A-C)=11$. $\therefore$ 11명.

#1.3.3(a)



$n(A\cup B)=30+40-7=63$. $\therefore 63$

(b) $n((A\cup C)^c)$
$=n(U)-n(A\cup C)$
$=100-(30+20-5)=55$. $\therefore 55$

(c) $n(A\cap B\cup C)$
$=n(A)+n(B)+n(C)-n(A\cap B)-n(A\cap C)-n(B\cap C)$
$+n(A\cap B\cap C)$
$=(30+40+20)-(7+5+10)+2$.
$=90-22+2=70$.

$\therefore 70$

PAGE
DATE

(d) $n[A \cup (C \cap B^c)]$

$= n[A \cup (C - B)]$.

$= 30 + 9 = 39$. $\therefore 39$.

#1.9.3 $n(A \times A) = n(A) \times n(A) = 9$. $\therefore n(A) = 3$

$A \times A = \{(a,b) \mid a \in A, b \in A\}$

$(0,1), (1,2)$ 이 원소로 $A = \{0,1,2\}$

$\therefore (0,0), (0,2), (1,0), (1,1), (2,0), (2,1), (2,2)$.

#1.49 $A \times (B \cap C) = (A \times B) \cap (A \times C)$ 증명.

$(x,y) \in A \times (B \cap C)$

$\leftrightarrow x \in A$ and $y \in (B \cap C)$.

$\leftrightarrow x \in A$ and $(y \in B$ and $y \in C)$.

$\leftrightarrow (x \in A$ and $y \in B)$ and $(x \in A$ and $y \in C)$.

$\leftrightarrow (x,y) \in A \times B$ and $(x,y) \in A \times C$.

$\leftrightarrow (A \times B) \cap (A \times C)$

$\therefore A \times (B \cap C) = (A \times B) \cap (A \times C)$.

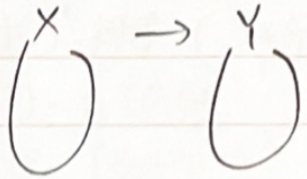
YANGJI

#1.4.5 $(A \times C) \cap (B \times D) = (A \cap B) \times (C \cap D)$

$(x,y) \in (A \times C) \cap (B \times D)$.
$\rightarrow (x \in A$ and $y \in C)$ and $(x \in B$ and $y \in D)$
$\rightarrow (x \in A$ and $x \in B)$ and $(y \in C$ and $y \in D)$
$\rightarrow (x \in A \cap B)$ and $(y \in C \cap D)$.
$\rightarrow (x, y) \in (A \cap B) \times (C \cap D)$

$\therefore (A \times C) \cap (B \times D) = (A \cap B) \times (C \cap D)$

#1.5.2 $n(X) = m$.
$n(Y) = n$.



$\therefore n^m$ 개

#1.5.9(a) $f \circ g = f(g(x))$
$= 3(5x)^2 + 2$.
$= 15x^2 + 2$.

(b) $g \circ f = g(f(x))$
$= 5(3x^2 + 2)$
$= 15x^2 + 10$

PAGE
DATE

(c) $f\cdot(g\circ f) = f(g(f(x))$
$= f(15x^2+10)$
$= 3(15x^2+10)^2+2.$
$= 3(225x^4+300x^2+100)+2$
$= 675x^4+900x^2+302.$

(d) $(f\circ g)\circ f = f(g(x))\cdot f(x).$
$= f(g(f(x))$
$= 675x^4+150x^2+302.$