

第1題.

(1) $S = \{0, 1, 2, 3\}$ /0
 $T = \{1, x, y\}$
 $V = \{0, w, z\}$
 (a) $S \times V = \{(0, 0), (0, w), (0, z), (1, 0), (1, w), (1, z), (2, 0), (2, w), (2, z), (3, 0), (3, w), (3, z)\}$
 (b) $S - T - V = \{2, 3\}$
 (c) $S \cap T \cap V = \emptyset$

第2題.

(2) (a) $\forall x \in \mathbb{R} (x^2 \neq -1)$ /0
 - For all values of x which are real numbers
 $x^2 \neq -1$
 - TRUTH VALUE - TRUE
 (b) $\exists x \in \mathbb{Z} (x^2 = 2)$
 - There exists a value x for all integers where
 $x^2 = 2$
 - TRUTH VALUE - FALSE

第3題.

(3) (a) $\lfloor \frac{1}{2} + \lceil \frac{3}{2} \rceil \rfloor = \lfloor \frac{1}{2} + 2 \rfloor$ /0
 $= \lfloor \frac{5}{2} \rfloor$
 $= 2$
 (b) $\lfloor -\frac{7}{8} + \lceil -\frac{3}{4} \rceil \rfloor = \lfloor -\frac{7}{8} + 0 \rfloor$
 $= \lfloor -\frac{7}{8} \rfloor$
 $= -1$

第4題.

(4)(a) $f(x) = -3x + 5$ 10

x	y
-1	8
0	5
1	2
-3	-4
3	14

\therefore It is a bijection because it is one-to-one and onto

(b) $f(x) = -5x^2 + 6$

x	y
-1	1
1	1

\therefore It is not a bijection because it is not one-to-one

(c)

$$f(x) = \frac{(x^2 - 1)}{(x + 1)} = \frac{(x + 1)(x - 1)}{(x + 1)} = x - 1$$

$$f(-1) = -2$$

$$f(0) = -1$$

$$f(1) = 0$$

$$f(2) = 1$$

It is a bijection because it is one-to-one and onto

第5題.

(5)(a) $\sum_{i=1}^2 \sum_{j=1}^3 (i+j) = \sum_{i=1}^2 (i+1) + (i+2) + (i+3)$ 10

$$= \sum_{i=1}^2 (3i + 6)$$

$$= (3 \cdot 1 + 6) + (3 \cdot 2 + 6)$$

$$= 9 + 12$$

$$= \underline{\underline{21}}$$

(b) $\sum_{i=0}^2 \sum_{j=0}^3 (ij) = \sum_{i=0}^2 (i \cdot 0) + (i \cdot 1) + (i \cdot 2) + (i \cdot 3)$

$$= \sum_{i=0}^2 (i + 2i + 3i)$$

$$= \sum_{i=0}^2 6i$$

$$= (6 \cdot 0) + (6 \cdot 1) + (6 \cdot 2)$$

$$= 6 + 12$$

$$= \underline{\underline{18}}$$

第6題.

(6) $f(x) = -x^2 + 3$; $f(x) < 0$
 $x \in \mathbb{R}$

It is not one-to-one

第7題.

(7) $S = \{-1, 0, 2, 4, 7\}$

(a) $f(x) = 1$
 $f(S) = 1$

(b) $f(x) = 2x + 1$
 $f(-1) = -2 + 1 = -1$
 $f(0) = 1$
 $f(2) = 5$
 $f(4) = 9$
 $f(7) = 15$
 $f(S) = \{-1, 1, 5, 9, 15\}$

第8題.

$$\begin{aligned}
 (8) \quad & f(x) = x^2 + 1 \quad /0 \\
 & g(x) = x + 2 \\
 (a) \quad & f + g = (x^2 + 1) + (x + 2) \\
 & \quad \quad = x^2 + x + 3 \\
 (b) \quad & fg = (x^2 + 1)(x + 2) \\
 & \quad \quad = x^3 + 2x^2 + x + 2
 \end{aligned}$$

第9題.

$$\begin{aligned}
 (9) \quad & A_i = \{1, 2, 3, \dots, i\} \text{ for } i = 1, 2, 3, \dots \\
 (a) \quad & \bigcup_{i=1}^n A_i = \{1, 2, 3, \dots, n\} \\
 (b) \quad & \bigcap_{i=1}^n A_i = A_1 \cap A_2 \dots \cap A_n \\
 & \quad \quad A_1 = \{1, 2, 3, \dots, 1\} \\
 & \quad \quad A_2 = \{1, 2, 3, \dots, 2\} \\
 \therefore & \bigcap_{i=1}^n A_i = \{1\}
 \end{aligned}$$