TUT-2

(1) $\mu_A(x) = \{0.2, 0.5, 0.6, 0.1, 0.9\}$

$\mu_B(x) = \{0.1, 0.5, 0.2, 0.7, 0.8\}$.

$\mu(A \cap B) = \cancel{\{0.2, 0.5, 0.1,\}}$
minimum $(\mu_A(x), \mu_B(x))$

$= \{0.1, 0.5, 0.2, 0.1, 0.8\}$

(2) $\mu A(x) = \{0.6, 0.5, 0.1, 0.7, 0.8\}$
$\mu B(x) = \{0.9, 0.2, 0.6, 0.8, 0.5\}$

$\mu A \cup B = \text{Max}[0.9, 0.5, 0.6, 0.8, 0.8\}$

$\mu_{\overline{A \cup B}} = \{0.1, 0.5, 0.4, 0.2, 0.2\}$

(3) $P = \{a, a, a, c, d, d\}$ $Q = \{a, a, b, c, c$

(a) $P \cup Q = \{a, a, a, b, c, c, d, d\}$
(b) $P \cap Q = \{a, a, c\}$.
(C) $P - Q = \{a, d, d,\}$

4 → $S = \{ (1, 2, \ldots 8, 9] \}$

(a) $[\{1,3,5\}, \{2,6\}, \{4,8,9\}]$ ✗

<u>Conditions:</u>

(i) $\bigcup_{i=1}^{n} A_i = S$

(ii) $A_i \cap A_j = \phi \ (i = j)$

(b) ✗

(c) ✓

5 → $S = \{a, b, c, d\}$ Bell Number B_n

- 4-Part partition

⇒ $\{ \{a\}, \{b\}, \{c\}, \{d\} \}$

- 3 part partition

⇒ $[\{a\}, \{b\}, \{c, d\}]$

$[\{a, b\}, \{c\}, \{d\}]$

$[\{a\}, \{b, c\}, \{d\}]$

$[\{a, c\}, \{b\}, \{d\}]$

$[\{a\}, \{b, d\}, \{c\}]$

$[\{a, d\}, \{c\}, \{b\}]$

- 2 part $[\{a, b, c\}, \{d\}]$

$[\{a, b, d\}, \{c\}]$

$[\{b, c, d\}, \{a\}]$

$[\{a, d, c\}, \{b\}]$

- 1 part $\{a, b, c, d\}$

$$B_n = \sum_{K=0}^{n-1} {}^{n-1}C_K \, B_K \quad \text{where } B_0 = 1$$

$B_4 = 15$

(7) →

A	B	A^c	$A^c \cap B$	LHS $A \cup (A^c \cap B)$	RHS $A \cup B$
0	0	1	0	0	0
0	1	1	1	1	1
1	0	0	0	1	1
1	1	0	0	1	1

As LHS = RHS

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

Set Builder Notation and Propositional Logic

- $x \in A \cap (B \cup C)$ By assumption

$= \{x : x \in A \text{ and } x \in B \cup C\}$ by definition of intersection

$= \{x : (x \in A) \wedge (x \in B \vee x \in C)\}$

$= \{ x [(x \in A) \wedge (x \in B)] \vee (x \in A \wedge x \in C) \}$.

Distributive Law

$= x : ((x \in A \cap B) \cup (x \in A \cap C))$

$= x \; (A \cap B) \cup (A \cap C)$

8 →

LHS RHS

$(B - A) \cup (C - A) = (B \cup C) - A$

Let $A = B$

$A \subseteq B$

and $B \subseteq A$

then $A = B$

LHS $\subseteq$ RHS — 1

and

RHS $\subseteq$ LHS — 2

LHS = RHS

To prove using subset method $(B - A) \cup (C - A) = (B \cup C) - A$

Proof 1 $(B - A) \cup (C - A) \subseteq (B \cup C) - A$

2 $(B \cup C) - A \subseteq (B - A) \cup (C - A)$

$\Rightarrow x \in \{(B - A) \cup (C - A)\}$ or $x \in (B - A) \vee x \in (C - A)$

(By definition of union)

or $(x \in B \wedge x \notin A) \vee (x \in C \wedge x \notin A)$

(By def of diff)

or $(x \in B \vee x \in C) \wedge (x \notin A)$

(By using distributive law of prop logic)

or $x \in (B \cup C) \wedge (x \notin A)$

$x \in (B \cup C - A)$

$(B - A) \cup (C - A) \subseteq (B \cup C) - A$ — 1