

# TUT DMA - B05

## Problem set 4.

### Problem 1:

a,  $P \cup Q$  : All students that are either in "the set of students who live within one mile of school" or in "the set of students who walk to classes".

b,  $P \cap Q$  : All students that are both in P and Q.

c,  $P - Q$  : All students in P that are not in Q.

d,  $P + Q$  : All students in Q that are not in P.

### Problem 2:

Using membership, we have:

for A	B	$A \cap B$	$\overline{A \cap B}$	$\overline{A}$	$\overline{B}$	$\overline{A} \cap \overline{B}$
1	1	1	0	0	0	0
1	0	0	1	0	1	0
0	1	0	1	1	0	0
0	0	0	1	1	1	1

→ Since the columns corresponding to set match, they are equal →  $\overline{A \cap B} = \overline{A} \cup \overline{B}$  &  $A \cap B = \overline{\overline{A} \cup \overline{B}}$ .

### Problem 3:

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

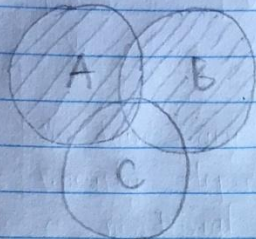
A	B	C	(1) $B \cap C$	(2) $A \cup (1)$	(3) $A \cup B$	(4) $A \cup C$	(2) $\cap$ (3)
1	1	0	0	1	1	1	1
1	0	1	0	1	1	1	1
1	0	0	0	1	1	1	1
1	1	1	1	1	1	1	1
0	1	1	1	1	1	1	1
0	0	0	0	0	0	0	0
0	0	1	0	0	0	1	0
0	1	0	0	0	1	0	0

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

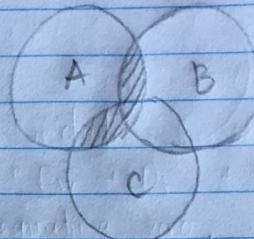


**Problem 4:**

a,  $A \cap (B - C)$



b,  $(A \cap B) \cup (A \cap C)$



c,  $(A \cap B) \cup (A \cap C)$  [same B]

**Problem 5:**

a,  $A \subseteq A$

b,  $A \subseteq B$

c,  $A \cap B = \emptyset$

d, Always true

e,  $A = B$

**Problem 6:**

a,  $\{3, 4, 5\} \Rightarrow 0011100000$

b,  $\{1, 3, 6, 10\} \Rightarrow 1010010001$

c,  $\{2, 3, 4, 7, 8, 9\} \Rightarrow 0111001110$

**Problem 10:**

a,  $f(m, n) = m + n \rightarrow$  onto

b,  $f(m, n) = m^2 + n^2 \rightarrow$  not onto

c,  $f(m, n) = m \rightarrow$  onto

d,  $f(m, n) = |n| \rightarrow$  not onto

e,  $f(m, n) = m - n \rightarrow$  onto

**Problem 11:**

a,  $f(x) = 2x + 1$  yes

b,  $f(x) = x^2 + 1$  no

c,  $f(x) = x^5$  yes