Problem 1.1 (S1)

a)

$\{23, 24\}$

b)

$\{x \in \mathbb{Z} : x \text{ is a perfect square and } 1 \leq x \leq 49\}$

Problem 1.2 (S1)

a)

☑ True

☐ False

It is true because the order does not matter in sets. Therefore, $\{c, b\} = \{b, c\}$ and $\{c, b, a, \ldots\} = \{a, b, c, \ldots\}$

b)

☐ True

☑ False

It is false. The element $\{a, b\}$ is not in P

c)

☑ True

☐ False

It is true. Since the order does not matter and Q contains elements b and c. Therefore $\{c, b\}$ is a proper subset of Q.

Problem 2.1 (S2)

a)

$\{-3, 0, 3, 6, 2, 5, 7\}$ $|(A \cap B) \cup C| = 7$

b)

$\{2, 5, 7\}$ $|\bar{A} \cap (B \cup C)| = 3$

c)

$\{(2,a), (2,b), (3,a), (3,b), (5,a), (5,b)\}$

$|(B \cap C) \times D| = 6$

	a	b
2	2a	2b
3	3a	3b
5	5a	5b

Problem 2.2 (S2) $A - B = A \cap \bar{B}$

$A - (B \cup C)$	start
$A \cap \overline{(B \cup C)}$	set subtraction law
$A \cap (\bar{B} \cap \bar{C})$	Demorgan's law
$A \cap A \cap (\bar{B} \cap \bar{C})$	Idempotent law
$A \cap A \cap \bar{B} \cap \bar{C}$	Associative law
$A \cap \bar{B} \cap A \cap \bar{C}$	comutative law
$(A \cap \bar{B}) \cap A \cap \bar{C}$	Associative law
$(A \cap \bar{B}) \cap (A \cap \bar{C})$	Associative law
$(A - B) \cap (A \cap \bar{C})$	set subtraction law
$(A - B) \cap (A - C)$	set subtraction law

$\therefore$ They are equivalent

Problem 3 (S3)

a)

- ☐ Property 1
- ☐ Property 2
- ☑ Property 3
- ☐ Property 4

Since some students are members of multiple clubs, The school clubs are not pairwise disjoint.
∴ Property 3 is not satisfied

b)

- ☐ Property 1
- ☐ Property 2
- ☐ Property 3
- ☑ Property 4

Since 10 students were absent, the union of every type of souvenirs do not form a partition.
∴ Property 4 is not satisfied.