1.
a) the set of students who lives within one mile of the school and walk to classes.

b) the set of students who lives within one mile of the school or walk to classes.

c) the set of students who lives within one mile of the school and dont walk to classes.

d) the set of students who doesn’t live within one mile of the school and walk to classes.

2.
a) $a \cap b$
b) a – b
c) $a \cup b$
d) $-a \cup -b$

3.
a) {0,1,2,3,4,5,6}
b) {3}
c) {1,2,4,5}
d) {0,6}

4.
a) {a,b,c,d,e,f,g,h}
b) {a,b,c,d,e}
c) {}
d) {f,g,h}

6.

a)
$a \cup \emptyset$ = {x | $x \in \emptyset \vee x \in a$ } = a

b)
$a \cap U$ = {x | $x \in U \wedge x \in a$ } = a

7.

a)
$a \cup U$ = {x | $x \in U \vee x \in a$ } = U

b)
$a \cap \emptyset$ = {x | $x \in \emptyset \wedge x \in a$ } = $\emptyset$

8.
a)
$a \cup a$ = {x | $x \in a \vee x \in a$ } = a
b)
$a \cap a$ = {x | $x \in a \wedge x \in a$ } = a

9.
a)
$a \cup -a$ = {x | $x \in a \vee x \notin a$ } = {x | $x \in a \vee x \in U$ } = U

b)
$a \cup -a$ = {x | $x \in a \wedge x \notin a$ } = {x | $x \in a \wedge x \in U$ } = $\emptyset$

10.
a)
$a - \emptyset$ = {x | $x \in a \wedge x \notin \emptyset$ } = a
b)
$\emptyset - a$ = {x | $x \in \emptyset \wedge x \notin a$ } = $\emptyset$

11.
a) $A \cup B$ = {x | $x \in A \vee x \in B$ } = {x | $x \in B \vee x \in A$ }
$B \cup A$ = {x | $x \in B \vee x \in A$ } = $A \cup B$

b) $A \cap B$ = {x | $x \in A \wedge x \in B$ } = {x | $x \in B \wedge x \in A$ }
$B \cap A$ = {x | $x \in B \wedge x \in A$ } = $A \cap B$

12. $A \cap B$ = {x | $x \in A \wedge x \in B$ }, $A \cup (A \cap B)$ = {x | $(x \in A \wedge x \in B) \vee x \in A$ }meaning that if x in a then x is sufficient for the statement above and is necessary for x to be in a to satisfy the set definition.

13. $A \cup B$ = {x | $x \in A \vee x \in B$ }, $A \cap (A \cup B)$ = {x | $(x \in A \vee x \in B) \wedge x \in A$ }meaning that if x in a then x is sufficient for the statement above and is necessary for x to be in a to satisfy the set definition of the set.

15.
1. $-(A \cup B)$ = {x | $x \notin A \wedge x \notin B$ } = {x | $x \in -A \wedge x \in -B$ } = $-A \cap -B$

16.

a) $A \cap B$ ={x | $x \in A \wedge x \in B$ },
let set y for context $y \subseteq z$ = {x | $x \in y \rightarrow x \in z$ }
same for $(A \cap B) \subseteq A$ = {x | $x \in A \rightarrow x \in B$ }

b) A = {x | $x \in A$ } using union with b $A \cup B$ = {x | $x \in A \vee x \in B$ }, leading to $A \subseteq (A \cup B)$ = {x | $x \in A \rightarrow (x \in A \vee x \in B)$ }

c) A – B = {x | $x \in a \wedge x\, not \in b$ } x can e an element of A then can be written as $A - B \subseteq A$

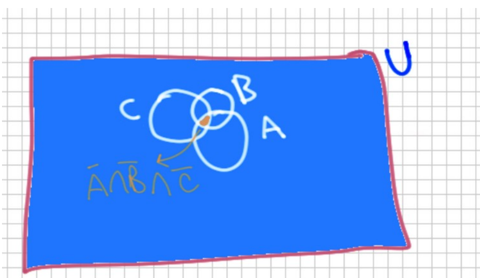
d) B – A = {x | $x\in B\wedge x\notin A$ }, A = {x | $x\in A$ } by the definition of intersection

$(B-A)\cap A$ = {x | $(x\in B\wedge x\notin A)\wedge x\in A$ } = Ø $(T\wedge F)\wedge F=F$

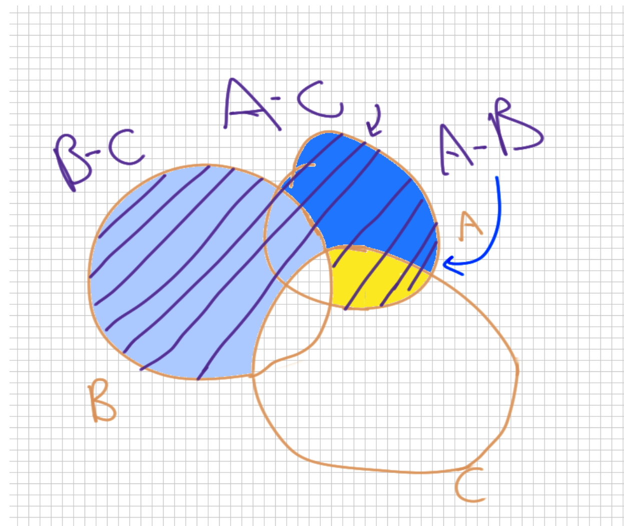
e) B – A = {x | $x\in B\wedge x\notin A$ }, $(B-A)\cup A$ = {x | $(x\in B\wedge x\notin A)\vee x\in A$ }
$A\vee(B\wedge -A)=(A\vee B)\wedge(A\vee -A)=A\vee B$, $(B-A)\cup A$ = $A\cup B$

26.
a)

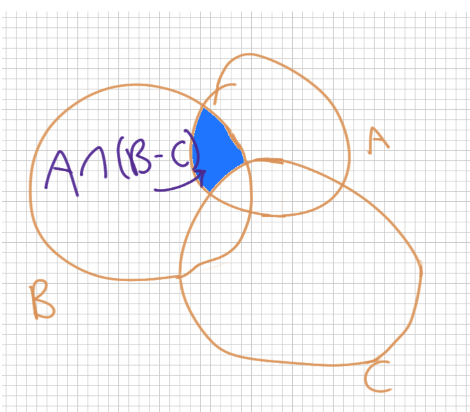
b)



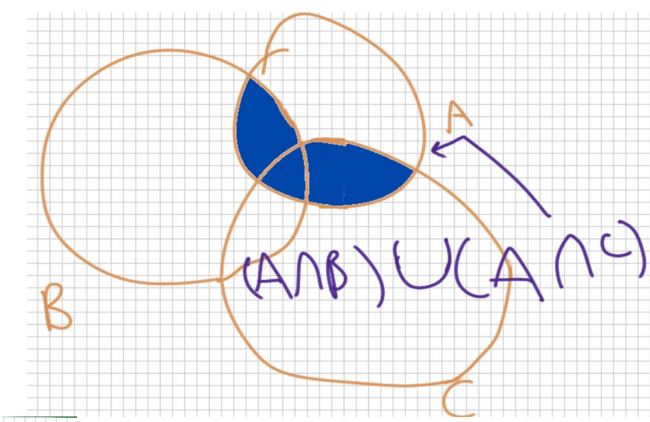
c)



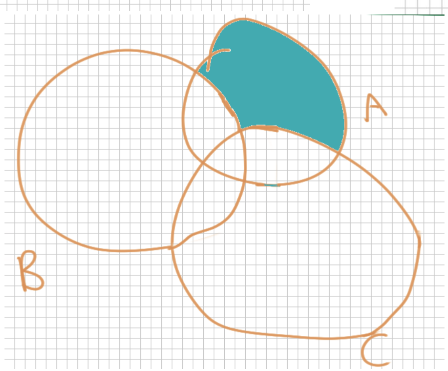
27.
a)



b)



c)



29.
a) B subset of A
b) A subset of B
c) B is emptyset or $B \cap A = \emptyset$
d)
e) A = B

30.
a) No, b) no, c) it seems intuitively not true but I can’t explain.

31.
from the definition of $A \subseteq B$ = $\forall x (x \in A \rightarrow x \in B)$ p → q == -q → -p
$\forall x (x \notin B \rightarrow x \notin A)$ = $-B \subseteq A$

45.
a) {1,2,3,….,n}
b) {1}

46.
a) {…, -2, -1, 0, 1, …,n}
b) {…, -2, -1, 0, 1}

48.
a) union : $\mathbb{Z}$ + , intersection : { $\emptyset$ }
b) union : $\mathbb{Z}$ + ,intersection :{0}
c) union : $\mathbb{Z}$, intersection : (0)
d) union : (1, ∞) , intersection : ($\emptyset$)

49.
a) union : $\mathbb{Z}$,intersection : {-1,0,1}
b) union : $\mathbb{Z}$ - {0},intersection : { $\emptyset$ }
c) union : [- ∞ , + ∞]intersection : [-1,1]
d) union : [1, ∞],intersection : { $\emptyset$ }