Will May M4 HW

4.1

1.) a.) True
b.) False
c.) True
d.) False

3.) a.) True
b.) False
c.) True
d.) True

6.) a.) False
b.) True
c.) True
d.) False

4.2

1.) a.) True
b.) True
c.) False
d.) False

2.) a.) $P(\{a\}) = \{\{\}, \{a\}\}$
b.) $P\{1,2\} = \{\{\}, \{1\}, \{2\}, \{1,2\}\}$

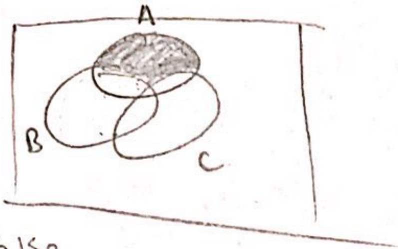
4.3

1.) a.) $\{-3, 0, 1, 4, 17, -12, -5, 6\}$
b.) $\{4, 1\}$
c.) Infinite
d.) $\{-5, 1, -3, 0, 1, 4, 17\}$

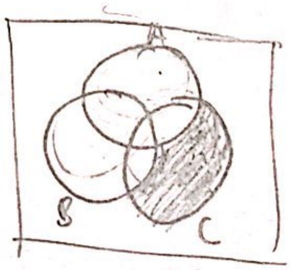
3.) a.) $\{1 \cap 3 \cap 16 \cap 125\}$
b.) $\{1 \cup 3 \cup 16 \cup 125\}$
c.) $\{x : x \in B_i$ for all i such that $-i \leq x \leq 1/i\}$
d.) $\{x : x \in B_i$ for some i such that $-1/i \leq x \leq 1/i\}$

4.4

1.) a.) a.) A – (B – C)



(A – B) – C



4.) a.) False
b.) True
c.) True
d.) False

4.5

1.) a.) Domination laws
b.) Absorption laws
c.) De Morgan's laws
d.) Double Complement law

2.) a.)

1. $(\bar{A} \cap C) \cup (A \cap C)$ Given
2. $(A \cup A) \cap C$ Distributive laws
3. $U \cap C$ Complement law
4. C Identity law

2.) b.) ① $(B \cup A) \cap (\bar{B} \cup A)$ Given

② $(B \cap \bar{B}) \cup A$ Distributive laws

③ $Q \cup A$ Complement laws

④ A Identity laws

c.) ① $\overline{A \cap \bar{B}} = \bar{\bar{B}} \cup \bar{A}$ Given

② $B \cup \bar{A}$ D'Morgan's Laws

③ $\bar{A} \cup B$ Communitave Laws

d.) ① $\bar{A} \cap (A \cup B) = \bar{A} \cap B$ Given

② $(\bar{A} \cap A) \cup (\bar{A} \cap B)$ Distributive Laws

③ $\emptyset \cup (\bar{A} \cap B)$ Complement Law

④ $\bar{A} \cap B$ Identity law

4.6

1.) a.) (tall, foam, whole)

b.) (foam, grande, non-fat)

c.) (foam, no-foam, non-fat, whole)

3.) a.) False

b.) True

c.) True

d.) True

4.) a.) $\{(+-), (-+) (++) (--)\}$

b.) $\{(000), (001), (011), (111), (110), (100), (101), (010)\}$

8.) a.) ① $A \times (B \cup C)$ Given

② $(x \in A) \wedge (y \in (B \cup C))$ Cartesian Product

③ $(x \in A) \wedge ((y \in B) \vee (y \in C))$ Union

④ $((x \in A) \wedge (y \in B)) \vee ((x \in A) \wedge (y \in C))$ distributive law

⑤ $((x,y) \in A \times B) \vee ((x,y) \in A \times C)$ Cartesian product

⑥ $((x,y) \in (A \times B) \cup (A \times C)$ Union

b.) ① $A \times (B \cap C) = (A \times B) \cap (A \times C)$ Given

② $(x \in A) \wedge (y \in (B \cap C))$ Cartesian product

③ $(x \in A) \wedge ((y \in B) \wedge (y \in C))$ Union

④ $(x \in A) \wedge (y \in B) \wedge (y \in C)$ Associative law

⑤ $(x \in A) \wedge (y \in B) \wedge (x \in A) \wedge (y \in C)$ Distributive laws

⑥ $((x,y) \in (A \times B)) \wedge ((x,y) \in (A \times C))$ Cartesian product

⑦ $((x,y) \in ((A \times B) \cap (A \times C))$ Union

4.7 1.) a.) Does not form a partition of D

Since $\partial \in A$ and $\partial \in B$

$A \cap B \neq \emptyset$ as $\partial \in A \cap B$

b.) Does not form a partition of D

$B \cup C \neq D$

Since $1 \in D$ but $1 \notin B \cup C$

c.) Does form a partition

$B \cap C = \emptyset$ and $B \cup C = E$

2.) a.) $\{0,1\}^3 = \{0,1\} \times \{0,1\} \times \{0,1\}$

$= \{(0,0), (0,1), (1,0), (1,1)\} \times \{0,1\}$

$= \{(0,0,0), (0,0,1), (0,1,0), (0,1,1), (1,0,0), (1,0,1), (1,1,0), (1,1,1)\}$

$A = \{0,0,0\}$

$B = \{(1,1,1)\}$

$C = \{(0,0,0), (0,0,1), (0,1,0), (0,1,1)\}$

$D = \{(0,1,0), (0,1,1)\}$

$E = \{(1,0,0), (1,0,1), (1,1,0), (1,1,1)\}$

$F = \{(0,0,0), (0,0,1)\}$

① $D \cup E \cup F = \{0,1\}^3$

$D \cap E = E \cap F = D \cap F = \emptyset$

$D \neq \emptyset$, $E \neq \emptyset$, $F \neq \emptyset$

② $C \cup E = \{0,1\}^3$

$C \cap E = \emptyset$

$C \neq \emptyset$, $E \neq \emptyset$