Homework #3

Kevin Fang

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Question 7.

Solve the following sections from the Discrete Math zyBook:

(a): Exercise 3.1.1

A.

True.

B.

False.

C.

True.

D.

False.

E.

True.

F.

False.

G.

False.

(b): Exercise 3.1.2

A.

False.

B.

True.

C.

True.

D.

True.

E.

False.

(c): Exercise 3.1.5

B.

$\{x \in \mathbb{Z} : x > 0$ *and an integer multiple of* $3\}$
The cardinality of the set is infinite.

D.

$\{x \in \mathbb{Z} : 0 \leq x \leq 1000$ *and an integer multiple of* $10\}$
The cardinality of the set is $|101|$.

(d): Exercise 3.2.1

A.

True.

B.

True.

C.

False.

D.

False.

E.

True.

F.

True.

G.

True.

H.

False.

I.

False.

J.

False.

K.

False.

Question 8.

Solve the following sections from the Discrete Math zyBook:

Exercise 3.2.4

B.

If set $A = 1, 2, 3$, then the power set of A, $P(A)$, is as follows:

$P(A) = \{\emptyset, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}\}$

$\{X \in P(A) : 2 \in X\}$, a subset of $P(A)$ with value 2 as an element, is as follows:

$\{X \in P(A) : 2 \in X\} = \{\{2\}, \{1, 2\}, \{2, 3\}, \{1, 2, 3\}\}$

Question 9.

Solve the following sections from the Discrete Math zyBook:

(a): Exercise 3.3.1

C.

$A \cap C = \{-3, 1, 17\}$

D.

$A \cup (B \cap C) = \{-5, -3, 0, 1, 4, 17\}$

E.

$A \cap B \cap C = \{1\}$

(b): Exercise 3.3.3

A.

$\{1\}$

B.

$\{1, 2, 3, 4, 5, 9, 16, 25\}$

E.

$\{x \in \mathbb{R} : -1/100 \leq x \leq 1/100\}$

F.

$\{x \in \mathbb{R} : -1 \leq x \leq 1\}$

(c): Exercise 3.3.4

B.

$P(A \cup B) = \{\emptyset, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}, \{a, b, c\}\}$

D.

$P(A) \cup P(B) = \{\emptyset, \{a\}, \{b\}, \{c\}, \{a, b\}, \{b, c\}\}$

Question 10.

(a): Exercise 3.5.1

B.

(foam, venti, non-fat)

C.

{(foam, non-fat), (foam, whole), (no-foam, non-fat), (no-foam, whole)}

(b): Exercise 3.5.3

B.

True.

C.

False.

E.

True.

(c): Exercise 3.5.6

D.

$xy = \{01, 011, 001, 0011\}$

E.

$xy = \{aaa, aaaa, aba, abaa\}$

(d): Exercise 3.5.7

C.

$(A \times B) \cup (A \times C) = \{aa, ab, ac, ad\}$

F.

$P(A \times B) = \{\emptyset, \{ab\}, \{ac\}, \{(ab), (ac)\}\}$

G.

$P(A) \times P(B) = \{(\emptyset, \emptyset), (\emptyset, \{b\}), (\emptyset, \{bc\}), (\{a\}, \emptyset), (\{a\}, \{b\}), (\{a\}, \{c\}), (\{a\}, \{bc\})\}$

Question 11.

(a): Exercise 3.6.2

B.

Set	*Laws*
$(B \cup A) \cap (\overline{B} \cup A)$	
$(A \cup B) \cap (\overline{B} \cup A)$	*Commutative*
$(A \cup B) \cap (A \cup \overline{B})$	*Commutative*
$A \cup (B \cap \overline{B})$	*Distributive*
$A \cup \emptyset$	*Complement*
A	*Identity*

C.

Set	*Laws*
$\overline{A \cap \overline{B}}$	
$\overline{A} \cup \overline{B}$	*De Morgan*
$\overline{A} \cup B$	*Double Complement*

(b): Exercise 3.6.3

B.

$$\text{Let } A = \{a, b\}$$
$$\text{Let } B = \{a\}$$
$$\therefore$$
$$A \cap B = \{a\}$$
$$\therefore$$
$$A - (A \cap B) = \{a, b\} - \{a\} = \{b\} \neq A$$

D.

$$\text{Let } A = \{a\}$$
$$\text{Let } B = \{a, b, c\}$$
$$\therefore$$
$$B - A = \{b, c\}$$
$$\therefore$$
$$(B - A) \cup A = \{a, b, c\} \neq A$$

(c): Exercise 3.6.4

B.

Set	*Laws*
$A \cap (B - A)$	
$A \cap (B \cap \overline{A})$	*Set Subtraction*
$B \cap (A \cap \overline{A})$	*Associative*
$B \cap \emptyset$	*Complement*
$\emptyset$	*Domination*

C.

Set	*Laws*
$A \cup (B - A)$	
$A \cup (B \cap \overline{A})$	*Set Subtraction*
$(A \cup B) \cap (A \cup \overline{A})$	*Distributive*
$(A \cup B) \cap U$	*Complement*
$A \cup B$	*Identity*