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DMGT - Tutorial - 1

Krishnaraj P
PA34
SY CSF

Q. 1. $A \cap B = A \cap C$

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

B can be written as :

$B = B \cap (\bar{A} \cup A)$

$= (B \cap A) \cup (\bar{A} \cap B)$

$= (A \cap B) \cup (\bar{A} \cap B)$

$= (A \cap C) \cup (\bar{A} \cap C)$ [given]

$= (A \cup \bar{A}) \cap C$

$= C$

So $B = C$.

Q.2 : $A = \{\phi, a\}$

So $P(A) = \{\{\phi\}; \{a\}, \phi, A\}$

$P(P(A)) = \{\{\phi\}, \{\{a\}\}, \{\phi\}, \{A\}, \phi, P(A)$

$\{\phi, A\}, \{\{\phi\}, \{a\}\}, \{\{a\}, \{A\}\}, \{\{\phi\}, \phi\}$

$\{\{\phi\}, \{a\}, \phi\}, \{\{\phi\}, \{a\}, A\}, \{\{a\}, \phi, A\}$

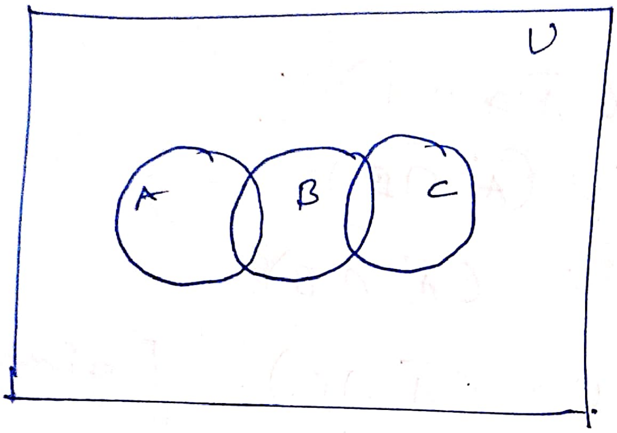
$\{\{\phi\}, \phi, A\}, \{\phi, \{a\}\}, \{\{\phi\}, A\}\}$

Q.3. $\cancel{A\cup}$ $A \cap B \cap C = \phi$

$A \cap B \neq \phi$

$A \cap C = \phi$

$B \cap C \neq \phi$



Q.4. $\left[\overline{(A \cap B) \cup C}\right] \cap \overline{B}$

$\left[\overline{(A \cup C) \cap (B \cup C)}\right] \cap \overline{B}$

$\left[\overline{A \cup C} \; \cancel{A} \cup \overline{(B \cup C)}\right] \cap \overline{B}$

$\left[(\overline{A} \cap \overline{C}) \cup (\overline{B} \cap \overline{C})\right] \cap \overline{B}$

$\left[(\overline{A} \cup \overline{B}) \cap \overline{C}\right] \cap \overline{B}$

$\cancel{\overline{A \cap B}}$ $\quad [\overline{A} \cup \overline{B}] \cap \overline{B} \cap \overline{C}$

$\overline{B} \cap \overline{C} \qquad (U \cap \overline{B} = \overline{B})$

(Q.5) $U = \{1, \dots, 600\}$

let $A = \{n : n \in U ;\ n \text{ divisible by } 5\}$

$B = \{n : n \in U ;\ n \text{ divisible by } 7\}$

$C = \{n : n \in U ;\ n \text{ divisible by } 13\}$

~~So $(A \cup B \cup C) = ?$~~

$|A| = \left[\frac{600}{5}\right] = 120$

$|B| = \left[\frac{600}{7}\right] = 85$

$|C| = \left[\frac{600}{13}\right] = 46$

$|A \cap B \cap C|$

$= \frac{600}{455}$

$= 1$

$|A \cap B| = \left[\frac{600}{35}\right] = 17$

$|B \cap C| = \left[\frac{600}{91}\right] = 6$

$|A \cap C| = \left[\frac{600}{65}\right] = 9$

$|A \cup B \cup C| = |A| + |B| + |C| + |A \cap B|$
$+ |A \cap C| + |B \cap C| - |A \cap B \cap C|$

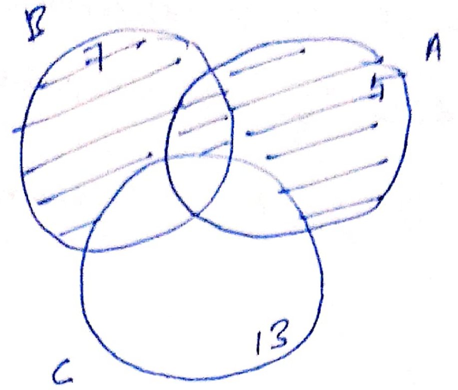
$= 120 + 85 + 46 - 17 - 6 - 9 + 1$

$= 220.$

So 220 are divisible by ~~7 & 5 & 13~~ 7 or 5 or 13.

only ~~22~~ 1 is divisible by 7 & 5 & 13

(b) 7 or 5 but not 13



From Venn diagram,

$|A \cup B| - |B \cap C|$
$- |C \cap A|$
$+ |A \cap B \cap C|$

$= |A| + |B| - |A \cap B|$
$- |B \cap C| - |C \cap A|$
$+ |A \cap B \cap C|$

$= 120 + 85 - 17 - 6 - 9 + 1$

$= 174$

Q. 6. $A \cap [a, a, b, c, d] = [a, b, c, d]$

So $A = [a, b, c, d]$

A can have any amount of elements of b, c, d but only 1 a.

$A = [n \cdot x \in \{b, c, d\} : n \geq 1, a]$
$n \in N$

Q. 7. a. If $A - B = B$

~~Then A could by be having all~~ Set A can not exist

as you cannot have B remaining

from set A if you remove it.

b. $A - B = B - A$

$\Rightarrow A = B$.

~~$A \cup B$~~ as let
$A - B = C$
$B - A = C$

But C has to be ϕ

so $A = B$

c. $A \oplus B = B \oplus A$

~~to~~ A and B could be any sets

~~as A and B are~~ as $\oplus$

is ~~co~~ commutaline. and it is

a property of the function $\oplus$