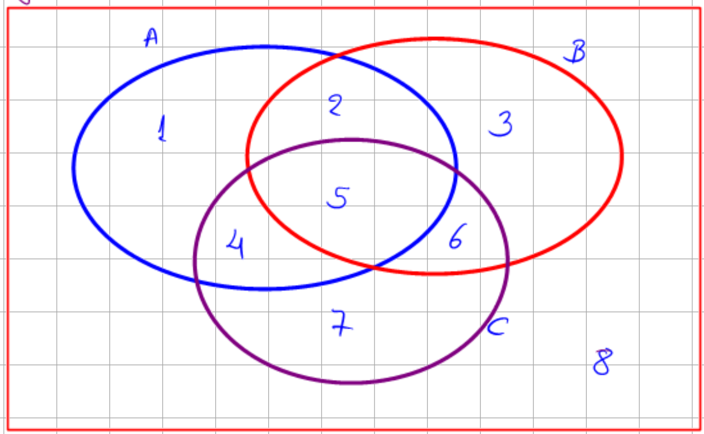
Ejercicio. Describe cada región en notación conjuntista.



R5 : $A \cap B \cap C$

R6 : $(B \cap C) - A$ B

R1 : $(A \setminus B) \setminus C$

R8 : $(A \cup B \cup C)^c$.

R23 : $B \setminus C$

R246 : $(A \cap B) \cup (A \cap C) \cup (B \cap$

R147 : $A \cup C \setminus B$

OPERACIONES ENTRE CONJUNTOS

Ejm.

1. Demostrar: $(A \cup B^c) \cap (A \cup B) = A$

Dem. $(A \cup B^c) \cap (A \cup B) = A \cup (B^c \cap B)$ dist.

$= A \cup \emptyset$, L. compl.

$= A$ L. ident.

2. Demostrar: $[(A^c \cup B) - A] \cap (A \cup B) = B - A$ $\left(\underline{B \cap A^c}\right)$?

Dem. $[(A^c \cup B) - A] \cap (A \cup B) = [(A^c \cup B) \cap A^c] \cap (A \cup B)$, L. comp.

$= A^c \cap (A \cup B)$ L. absor..

$= (A^c \cap A) \cup (A^c \cap B)$ L. dist.

$= \underline{\emptyset} \cup (\underline{B \cap A^c})$ L. comp. / Conm.

$= B \cap A^c$ L. ident.

$= B - A$ L. comp.

3. Demostrar: $(A^c - B^c) \cup [B - (B - A)] = B$

Dem. $(A^c - B^c) \cup [B - (B - A)] = B$

4. Demostrar: $[A \triangle (B - A)] - B = A - B$

Dem. $[A \triangle (B - A)] - B = [(A - (B - A)) \cup ((B - A) - A)] - B$

$= \{[A \cap (B \cap A^c)^c] \cup [(B \cap A^c) \cap A^c]\} \cap B^c$

$$= \left\{ \left[A \cap (B^c \cup A) \right] \cup \left[B \cap A^c \right] \right\} \cap B^c$$

$$= \left[A \cup (B \cap A^c) \right] \cap B^c$$

$$= \left[(A \cup B) \cap (A \cup A^c) \right] \cap B^c$$

$$= \left[(A \cup B) \cap U \right] \cap B^c$$

$$= (A \cup B) \cap B^c$$

$$= (A \cap B^c) \cup (B \cap B^c)$$

$$= (A \cap B^c) \cup \phi$$

$$= A \cap B^c$$

$$= A - B$$

CARDINAL DE UN CONJUNTO

Sea A un conjunto finito definido en el universo U.

Definimos el "cardinal de A" como el número de elementos de A.

Lo denotamos por $\eta(A)$

Por ejemplo, si $A = \{a, b, c, d, e\}$, $\eta(A) = 5$

$B = \{ \}$, $\eta(B) = 0$

Propiedades

1. $\eta(A - B) = \eta(A) - \eta(A \cap B)$

2. $\eta(A \triangle B) = \eta(A \cup B) - \eta(A \cap B)$

3. $\eta(A \cup B) = \eta(A) + \eta(B) - \eta(A \cap B)$

4. $\eta(A \cup B \cup C) = \eta(A) + \eta(B) + \eta(C) - \eta(A \cap B) - \eta(A \cap C) - \eta(B \cap C) + \eta(A \cap B \cap C)$

Dem. 4

$(A \cap C) \cup (B \cap C)$

$$\eta((A \cup B) \cup C) = \eta(A \cup B) + \eta(C) - \eta((A \cup B) \cap C)$$

$$= \eta(A) + \eta(B) - \eta(A \cap B) + \eta(C) - \eta((A \cap C) \cup (B \cap C))$$

$$= \eta(A) + \eta(B) + \eta(C) - \eta(A \cap B) - \left[\eta(A \cap C) + \eta(B \cap C) - \eta((A \cap C) \cap (B \cap C))\right]$$

$$= \eta(A) + \eta(B) + \eta(C) - \eta(A \cap B) - \eta(A \cap C) - \eta(B \cap C) + \eta(A \cap B \cap C)$$

Ejemplo: Sean los conjuntos: $U = \{-2, -1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$

$A^c = \{-2, 2, 3, 4, 5, 6, 7, 8, 9\}$ $\qquad A = \{x \in U / x^3 = x\} = \{-1, 0, 1\}$

$B^c = \{4, 5, 6, 7, 8, 9\}$ $\qquad B = \{x / x^2 \in U\} = \{-2, -1, 0, 1, 2, 3\}$

$C^c = \{-2, -1, 7, 8, 9\}$ $\qquad C = \{x \in U / 0 \le x < 7\} = \{0, 1, 2, 3, 4, 5, 6\}$

Hallar $\eta(A - B)$, $\eta(A \,\Delta\, B)$, $\eta(B^c \,\Delta\, C^c)$ y $\eta(A \cup B \cup C)$

$\eta(A) = 3$, $\eta(B) = 6$, $\eta(C) = 7$

a) $\eta(A - B) = 0$ $\qquad$, $A - B = \{\ \}$

b) $\eta(A \,\Delta\, B) = \eta(A \cup B) - \eta(A \cap B)$ $\qquad$ $A \cup B = \{-2, -1, 0, 1, 2, 3\}$

$\qquad A \cap B = \{-1, 0, 1\}$

$= 6 - 3$

$= 3$ $\qquad B^c \cup C^c = \{-2, -1, 4, 5, 6, 7, 8, 9\}$

$\qquad B^c \cap C^c = \{7, 8, 9\}$

c) $\eta(B^c \,\Delta\, C^c) = \eta(B^c \cup C^c) - \eta(B^c \cap C^c)$

$= 8 - 3$

$= 5$

d) $\eta(A \cup B \cup C) = 9$ $\qquad A \cup B \cup C = \{-2, -1, 0, 1, 2, 3, 4, 5, 6\}$