

1. Actividad "Attention is all you need" (Opcional)

2. Repaso:

- Conjuntos y representación
- Relaciones entre conjuntos ($=, \neq, \subseteq, \not\subseteq, \subset, \supset, \text{conjuntos disjuntos}$)
- Tipos de conjuntos (\emptyset, U, \dots) ^{conjunto potencia (P)}
- Cardinalidad (Lo vemos después de las operaciones)

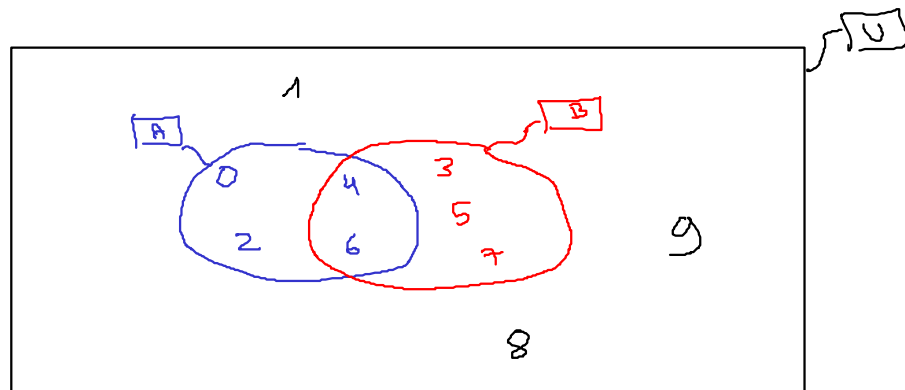
3. Operaciones entre conjuntos:

$$U = \{x \in \mathbb{N} \mid x < 10\} = \{0, 1, 2, 3, \dots, 9\}$$

$$A = \{0, 2, 4, 6\} = \{x \in U \mid x \text{ es un par menor o igual a } 6\}$$

$$= \{x \mid (x \% 2 = 0) \wedge (x \leq 6)\}$$

$$B = \{3, 4, 5, 6, 7\} = \{x \mid 3 \leq x \leq 7\}$$



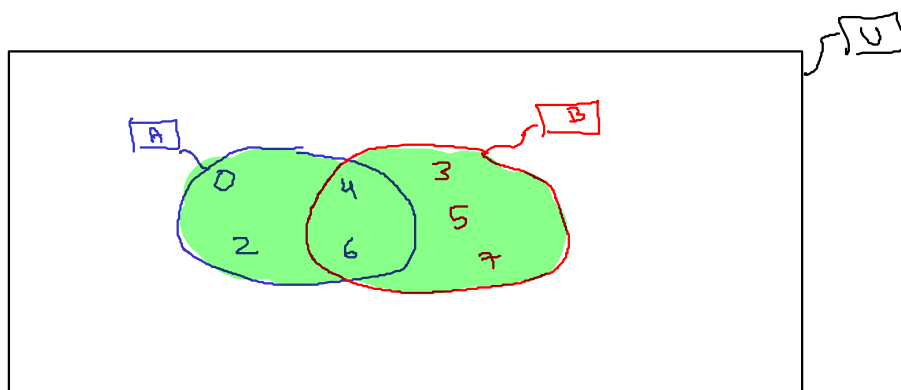
i. Unión ($A \cup B$)

$$A \cup B = \{x \mid x \in A \vee x \in B\}$$

$$A = \{0, 2, 4, 6\}$$

$$B = \{3, 4, 5, 6, 7\}$$

$$A \cup B = \{0, 2, 4, 6, 3, 5, 7\}$$



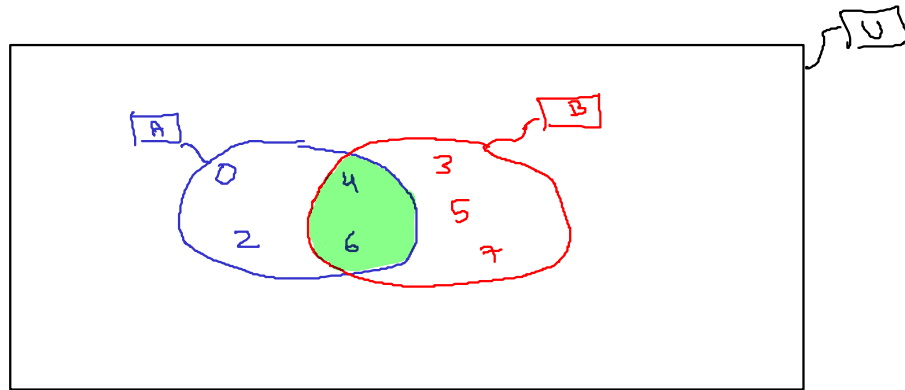
ii. Intersección ($A \cap B$)

$$A \cap B = \{x \mid x \in A \wedge x \in B\}$$

$$A = \{0, 2, 4, 6\}$$

$$B = \{3, 4, 5, 6, 7\}$$

$$A \cap B = \{4, 6\}$$



iii. Diferencia: $A - B$

$$A - B = \{x \mid x \in A \wedge x \notin B\}$$

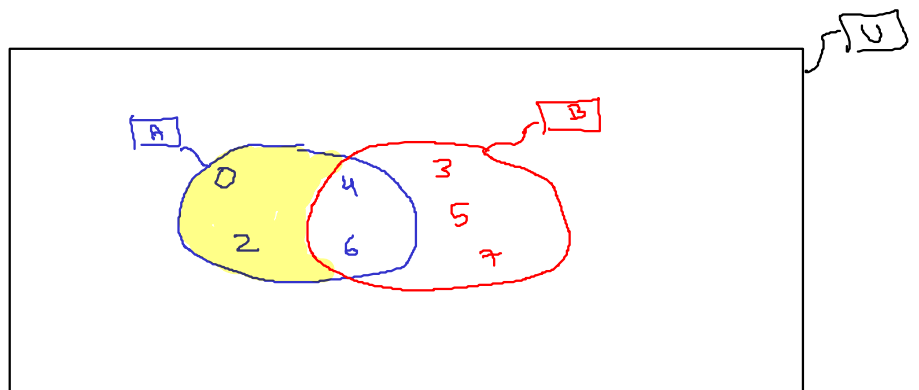
$$A = \{0, 2, 4, 6\}$$

$$B = \{3, 4, 5, 6, 7\}$$

$$A = \{0, 2, 4, 6\}$$

$$B = \{3, 4, 5, 6, 7\}$$

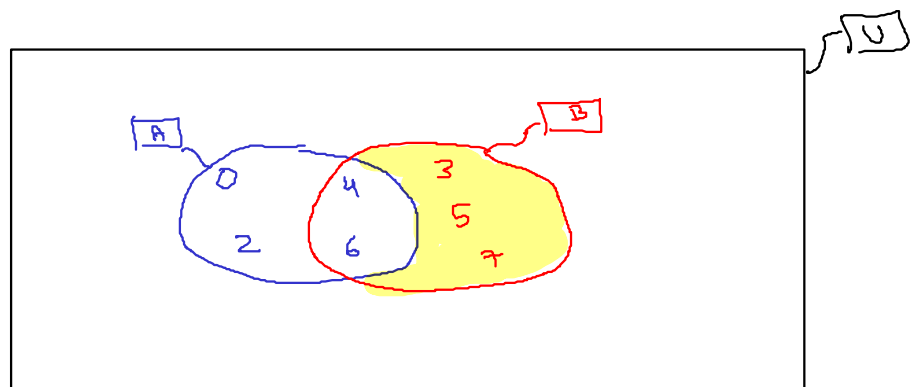
$$\rightarrow A - B = \{0, 2\}$$



$$A = \{0, 2, 4, 6\}$$

$$B = \{3, 4, 5, 6, 7\}$$

$$\rightarrow B - A = \{3, 5, 7\}$$



iv. Complemento: $A' = A^c = \bar{A}$

$$A' = \{x \mid x \notin A\}$$

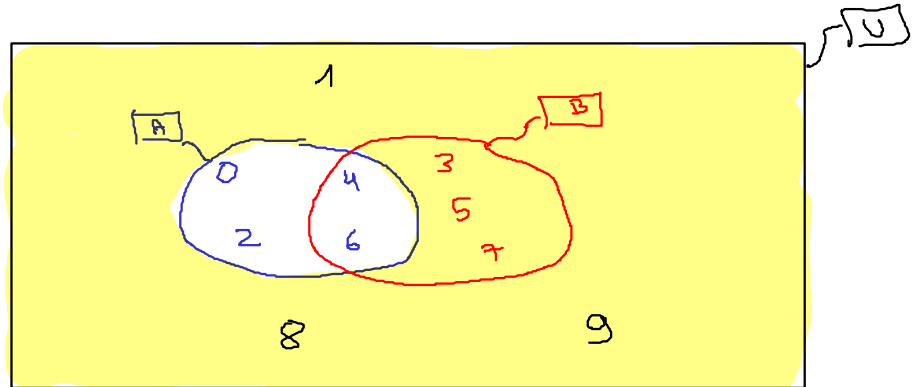
$$A = \{0, 2, 4, 6\}$$

$$B = \{3, 4, 5, 6, 7\}$$

$$A = \{0, 2, 4, 6\}$$

$$U = \{0, 1, 2, \dots, 9\}$$

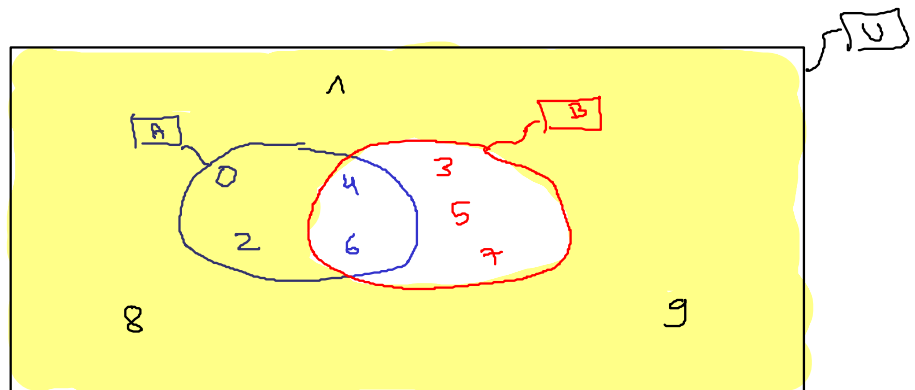
$$\rightarrow A' = \{1, 3, 5, 7, 8, 9\}$$



$$B = \{3, 4, 5, 6, 7\}$$

$$U = \{0, 1, 2, \dots, 9\}$$

$$\rightarrow B' = \{0, 1, 2, 8, 9\}$$



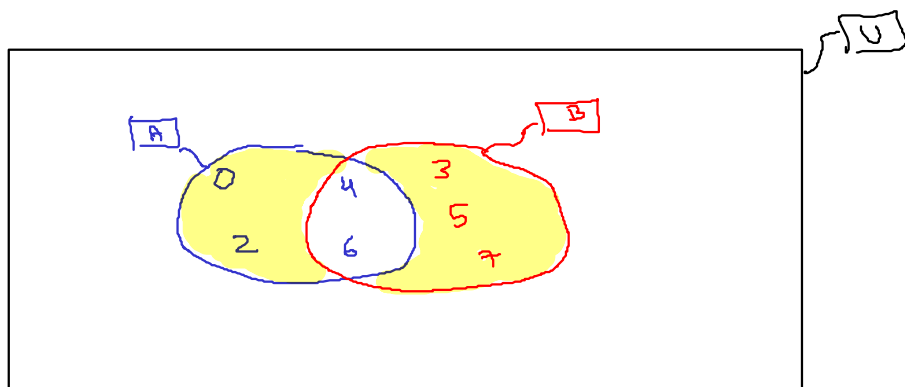
v. Diferença simétrica ($A \oplus B = A \Delta B$)

$$A \oplus B = \{x \mid (x \in A \wedge x \notin B) \vee (x \in B \wedge x \notin A)\}$$

$$A = \{0, 2, 4, 6\}$$

$$B = \{3, 4, 5, 6, 7\}$$

$$\rightarrow A \oplus B = \{0, 2, 3, 5, 7\}$$



4. Cardinalidad: Numero de elementos de un conjunto

$A \longrightarrow$ Cardinalidad de A :

$$|A| = n(A) = \text{card}(A) = \#(A)$$

Ejemplo:

Conjunto

Cardinalidad

$$A = \{3\}$$

$$|A| = 1$$

$$B = \{\}$$

$$|B| = 0$$

$$C = \{L, M, W, T, V, S, D\}$$

$$n(C) = 7$$

$$\mathbb{Z} = \{\dots, -1, 0, 1, \dots\}$$

$$n(\mathbb{Z}) = \infty \rightsquigarrow n(\mathbb{Z}) = \aleph_0$$

$$D = [-1, 1]$$

$$\text{card}(D) = \infty$$

$$E = \{5, 6, 7, \dots\}$$

$$\#(E) = \infty$$

$$F = \{\emptyset\}$$

$$|F| = 1$$

$$G = \{\{1\}\}$$

$$|G| = 1$$

5. Conjunto Potencia:

$A \longrightarrow$ Conjunto potencia de A :

$P(A)$: Conjunto formado por todos los subconjuntos que se pueden construir a partir de los elementos del conjunto A .

$$P(A) = \{ \emptyset, \underbrace{\{ \dots \}, \{ \dots \} }_{\substack{A \\ \{ \}}} \} \quad x_i \subset A$$

$$\text{Cardinalidad: } |P(A)| = n(P(A)) = 2^{|A|} = 2^{n(A)}$$

Ejemplo: $X = \{0, 1, 2\}$

$P(X) = ?$

$$|X| = 3$$

$P(X) = ?$

$$\textcircled{1} |P(X)| = 2^{|X|} = 2^3 = 8$$

$$|P(X)| = n(P(X)) = 8$$

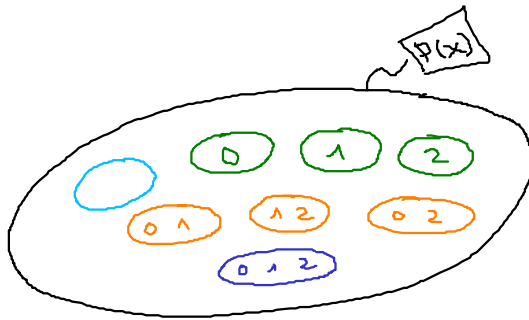
$$X = \{0, 1, 2\}$$

$$\textcircled{2} P(X) = \{ \{3\},$$

$$\{0\}, \{1\}, \{2\},$$

$$\{0, 1\}, \{1, 2\}, \{0, 2\},$$

$$\{0, 1, 2\}$$



$$\checkmark U = +$$

$$\checkmark \cap = \cdot$$

$$\checkmark \neg = ' \quad A \cup B = A + B$$

$$A \cup B = A + B$$

$$A \cap B = A \cdot B = AB$$

$$A' = \neg A = \overline{A} = A^c$$

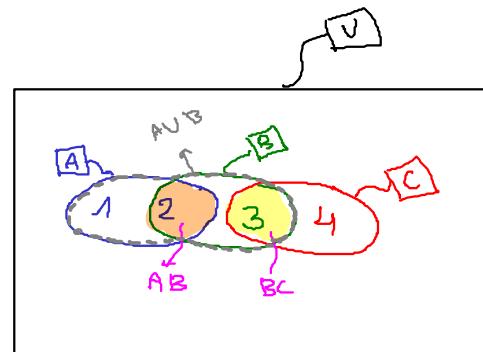
6. Identidades de cardinalidad

Nombre	Equivalencia
1	$ \emptyset = 0$
2	$A \cdot B = \emptyset \rightarrow A + B = A + B $
3	$ A + B = A + B - A \cdot B $
4	$ A - B = A + A \cdot B $
5	$ A \cdot B \leq A $
6	$ A \leq A + B $
7	$ A' = U - A $
8	$a \leq A \leq b \leftrightarrow U - a \leq A' \leq U - b$
9	$\text{Max}(A , B) \leq A + B \leq \text{Min}(A + B , U)$
10	$\text{Max}(0, A + B - U) \leq A \cdot B \leq \text{Min}(A + B)$

Identidades con igualdades:

$$\left. \begin{array}{l} A = \{1, 2\} \\ B = \{2, 3\} \\ C = \{3, 4\} \end{array} \right\} U = \{1, 2, 3, 4\}$$

Reglas:



Del D. Venn

$$|A| = 2$$

$$|B| = 2$$

$$|C| = 2$$

$$|AB| = 1$$

$$|BC| = 1$$

$$|A + B| = 3$$

$$|A + C| = 4$$

$$|U| = 4$$

$$\textcircled{1} |\emptyset| = 0$$

$$|AC| = |\emptyset| = 0$$

$$\textcircled{2} A \cdot B = \emptyset \rightarrow |A + B| = |A| + |B|$$

$$A + C = \{1, 2, 3, 4\}$$

$$|A + C| = |A| + |C| = 2 + 2 = 4$$

$$\textcircled{4} |A - B| = |A| - |AB|$$

$$|A - B| = |A| - |AB| = 2 - 1 = 1$$

$$|A - C| = |A| - |AC| = 2 - 0 = 2$$

$$\textcircled{5} |A'| = |U| - |A|$$

$$|A'| = |U| - |A| = 4 - 2 = 2$$

$$\textcircled{3} |A + B| = |A| + |B| - |AB|$$

$$A + B = \{1, 2, 3\} \rightarrow |A + B| = 3$$

$$|A + B| = |A| + |B| - |AB| = 2 + 2 - 1 = 3$$

