

AICC - Sets and relations

Sets:

unordered collect^o of objects

Roster method. eg:

$$\mathbb{N} = \{0, 1, 2, 3, 4, \dots\}$$

$$A = \{1, 2, 3, 5\}$$

Set Builder Notation

$$\mathbb{N} = \{x \in \mathbb{Z} \mid x \geq 0\}$$

$$\mathbb{N} = \{x \mid x \text{ is not negative and } x \text{ is int}\}$$

Interval Notation

$$[a, b] = \{x \mid a \leq x \leq b\}$$

Subsets / Supersets

A subset of B $\Rightarrow A \subseteq B$
B superset of A

Powerset

$P(A)$ is set containing all subsets of A

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

$$= \{\{1, 2, 3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1\}, \{2\}, \{3\}, \{\emptyset\}\}$$

Universal Set

contains everything

Empty Set (\emptyset)

$$\triangle \{ \emptyset \} \neq \emptyset$$

Complement

$$\bar{A} = \{ x \mid x \notin A \} = U - A$$

↑ universal set

Union

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

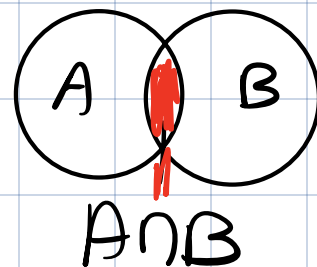
Intersect^o

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

Cardinality

$$|S| = n$$

↓



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

Tuples

ordered n -tuple is an ordered collection of n elements.

$T_1 = T_2$ if same size and same elements
Same order

Cartesian products

$A_1 \times A_2$ is set of all ordered tuples of size 2 containing elements of A_1 and A_2 .

Relat^o

any subset of cartesian product

binary relatioⁿ from set A to set B is
a subset $R \subseteq A \times B$

reflexivity

symmetry and antisymmetry

$\{(1,2), (2,1), (1,3)\}$
not sy. or antisy.

↳ no symmetric
pairs (a,b) (b,a)
 $a \neq b$ in
the relation

$\{(1,1)\}$ is sy. and antisy.
or \emptyset

transitivity

$$\forall a \forall b \forall c ((a,b) \in R \wedge (b,c) \in R) \Rightarrow (a,c) \in R$$

e.g. $\{(1,2), (2,2), (2,3), (3,1)\}$
on the set $\{1,2,3\}$ not trans.
 $\because (2,1) (1,3)$ are missing

Number of Relate = numb. of sets
 $= 2^{|S|}$

