Review terminology & notations for sets, functions

SETS

- set = collection of elements / anything (including other sets)
  - unordered
  - no duplicate elements

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

$\{1, hi, \{a,b,\square\}\}$

$\emptyset = \{\}$ $\emptyset$ = nothing?

$\{1,3,\emptyset,hi\} \neq \{hi,1,3\}$

contains $\emptyset$ as an elem.

does not contain $\emptyset$ as an elem.

Operations: for sets A, elements x

- $|A|$ = size of A = # of direct elements

$$|\{2, \{hi, \emptyset\}, 3, 2, 1, \emptyset\}| = 5$$

$$|\emptyset| = 0$$

- $x \in A$: x is a direct element of A

$$3 \in \{2, \{hi, \emptyset\}, 1, 3\}$$

$$hi \notin \{2, \{hi, \emptyset\}, 1, 3\} \qquad \{2, \square, 1, 3\}$$

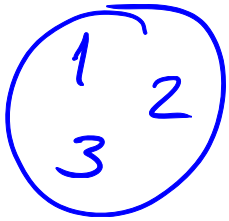
- $A \subseteq B$: A is a subset of B

every elem. of A is also in B

$$\{1, 2\} \subseteq \{hello, 3, \emptyset, 2, 1\}$$

$A \subseteq A$: always $\qquad \emptyset \subseteq A$: always

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



$\{hi\} \stackrel{?}{\subseteq} \{2, \{hi, \emptyset\}, 1, 3\}$ NO

- $A \cup B = \{x \mid x \in A \text{ or } x \in B\}$ (union)

general form of elements — "where" — condition

$\{1,2,3\} \cup \{2,4,6\} = \{1,3,4,6,2\}$

- $A \cap B = \{x \mid x \in A \text{ and } x \in B\}$ (intersection)

$\{1,2,3\} \cap \{2,4,6\} = \{2\}$

- $A \setminus B = \{x \mid x \in A \text{ and } x \notin B\}$ (difference)

$\{1,2,3\} \setminus \{2,4,6\} = \{1,3\}$

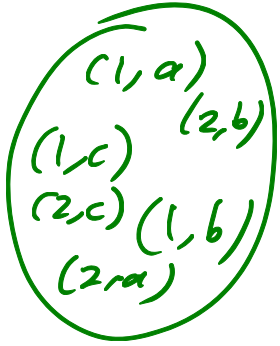
~~A / B~~

- $A \times B = \{(x,y) \mid x \in A \text{ and } y \in B\}$ (cartesian product)

$\{1,2\} \times \{a,b,c\} = \{(1,a),(1,b),(1,c),(2,a),(2,b),(2,c)\}$

- $\mathcal{P}(A) = \{s \mid s \subseteq A\}$ (power set)

$\mathcal{P}(\{1,hi\}) = \{\emptyset, \{1\}, \{hi\}, \{1,hi\}\}$



$s \subseteq A$

$\{1, \{a,b\}, 2\} = \{1, A, 2\}$

Next time... functions and summation & product notation and propositional logic