Website: math4cs.university

Lecture 2: Sets (continued)

5.73 = 573/100

⚠ Common confusion

item $\in$ Set
↑ "belongs to"

Subset $\subset$ Set (Strictly)
↑ ("is included in")
↑ "is a strict subset of"

2.222... does it repeat? → $\mathbb{Q}$

$\pi = 3.14159265...$ doesn't repeat → $\mathbb{R}$

Example: Let $X = \{1, \{7\}\}$
"X is the set containing the element/item 1 and a set containing the item 7"

Which statement: (a) is syntactically correct? (b) is true?

- $1 \in X$
- ~~$1 \subset X$~~ a because 1 is not a subset/set (a)
- ~~$\{1\} \in X$~~ b because X does not contain an item {1 (a)
- $\{1\} \subset X$ because all elements of {1} are contained in X, $1 \in \{1\}$ and $1 \in X$ (b)
- ~~$7 \in X$~~ b
- ~~$7 \subset X$~~ a
- $\{7\} \in X$
- ~~$\{7\} \subset X$~~ b because it would imply $7 \in X$ (by definition of a subset, every element in the subset on the left also belongs to the right)
- $\{\{7\}\} \subset X$
- ~~$X \subset 1$~~ a
- ~~$X \subset \{7\}$~~ b

Final question? (strict) subset $\subset$ $\subsetneq$; subset or equal $\subseteq$ equal sign

$\{7\} \not\subset \{7\}$

$\{7\} \subseteq \{7\}$

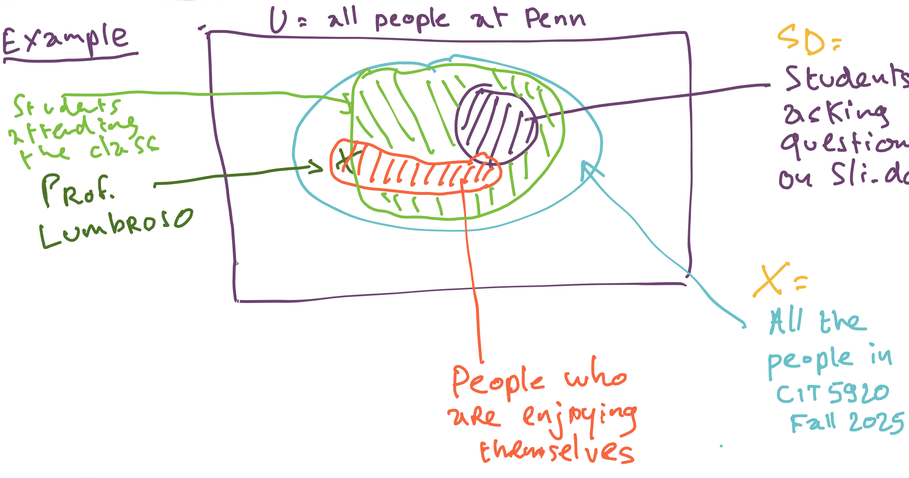
In addition: $\emptyset \subset X$ $\quad$ $\emptyset \notin X$

SEMANTIC ROLES (typing)

1	element
{1}	set
~~element $\subset$ set~~	
element $\in$ set	
set $\subset$ set	

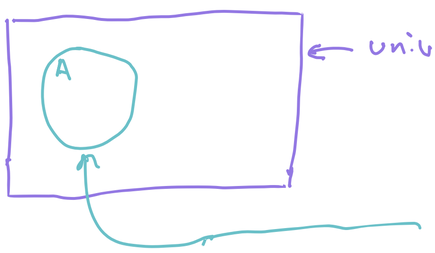
VENN DIAGRAMS = picture representation of sets

Example



Students asking questions on Sli.do $\subset$ All the people in CIT 5920

$SD \subset X$



← universe of all elements (U) = Ω

the set A within the universe

$A \subseteq U$