OH Thus Fri 19:00-20:00, Zoom
     Fri 15:00-16:00, MC130
HW Fri 23:55
Read 1.3, 1.4
Do Oritentation test

Puzzle 13 head up, 12 tail up, allow to flip, blind
goal: 2 piles of a same number of head up.

13 wins		12 coins

§1.1+1.2 Validity of Arguments.

- If it won't both rain or snow tomorrow
- If it will rain tmr.
Conclusion: it won't snow tmr.
In symbols: $\neg(R \land S)$
$$\frac{R}{\neg S.}$$

Truth table:

R	S	$\neg(R \land S)$	$\neg S$.
F	F	T	T
F	T	T	F
T	F	T	T
T	T	F	F

Check all rows that all premsis are true
If the conclusion is true, then it is a valid conclusion

eg.2. $(R \land S) \lor (\lnot S)$

$$\frac{R}{S}$$

truth table:

R	S	$(R \land S) \lor (\lnot S)$		
F	F	F	T	T
F	T	F	F	F
T	F	F	T	T
T	T	T	T	F

$\Rightarrow$ this conclusion is invalid.

§1-3 Variables + Sets.

Statements could depend on variables.

E_x

$E(x): x$ is an even integer

$\Rightarrow$ this statement is depended on variable x

$C(x,n): x$ people have n cell phones.

$C(x,n) \land E(n): x$ people ------

Sets:

eg: $A = \{7, 8, 9\}$. $7 \in A$
          $\uparrow$ $6 \notin A$
      element

two sets are equal iff they have same elements.

$B = \{9, 7, 8\}$, $B = A$ ↙ * Webwork does not support this.
$C = \{7, 9, 8, 7\}$, $C = A$ the order does not matter.
$D = \{7, 8, 9, 10\}$, $D \neq A$.

e.g. $N = \{0, 1, 2, 3 \cdots \}$.   nature number set.
          $\overline{\uparrow}$
      nature number includes 0.

Truth sets :
   Given $P(x)$, can from the set $\{x | P(x)\}$,
   which is called the truth set of $P(x)$.

e.g. $\{x \mid E(x)\} = \{ \cdots -4, -2, 0, 2, 4 \cdots \}$

Given a set A, can condition the elementhood test: determine whether an element is in the set.

e.g. $\{x \mid x^2 \le 4\} = [-2, 2]$
$y \in \{x \mid x^2 \le 4\} \Rightarrow y \in [-2, 2]$.

Universe of discourse   Rationals
$\{x \in u \mid P(x)\} \Rightarrow \{x \mid x \in u \wedge P(x)\}$. $\downarrow$ $\downarrow$ positive real numbers.
comment examples of u: $\mathbb{R}, \mathbb{N}, \mathbb{Z}, \mathbb{Q}, \mathbb{R}^+, \mathbb{R}^-$, etc ...

$\{x \in \mathbb{R} \mid x^2 \le 4\} = [-2, 2] \Leftarrow$ infinite set
$\{x \in \mathbb{Z} \mid x^2 \le 4\} = \{-2, -1, 0, 1, 2\} \Leftarrow$ 5 elements only.
$\{x \in \mathbb{N} \mid x^2 \le 4\} = \{0, 1, 2\}$.
$\vdots$ $\vdots$

Sometimes we just says a certain set is our "universe of discourse" and omit "$\in u$".

• What is $P(x)$ is true for every $x \in u$.
   $\{x \in u \mid P(x)\} = u$.
   What is $P(x)$ is always false?
   $\{x \in u \mid P(x)\} = \phi$.

$\{x \in \mathbb{R} \mid x^2 = -1\} = \phi$