HW2. due Fri 11:59 pm.
Read 1.5 2.1 2.2.

Biconditional

$P \leftrightarrow Q$ means $(P \to Q) \wedge (Q \to P)$

P	Q	$P \to Q$	$Q \to P$	$P \leftrightarrow Q$
F	F	T	T	T
F	T	T	F	F
T	F	F	T	F
T	T	T	T	T

P and Q have same truth value

e.g. if you attend, you must signed up.
if you no attend, don't signed up.

$(A \to S) \wedge (\neg A \to \neg S)$
$\not\Rightarrow (A \to S) \wedge (S \to A)$
$\not\Rightarrow A \leftrightarrow S$.

In english: $P \leftrightarrow Q$ P $\not\Rightarrow$ Q.
P is necessary & sufficient to Q.

Ex: if you don't eat dinner, you won't get ice cream.
$\neg D \to \neg I$.
$\not\Rightarrow I \to D$
* but it does not mean that $D \to I$

Intervals. (not in the text).
$a, b \in \mathbb{R}$.
$(a,b) = \{x \mid a < x < b\}$.
$[a,b] = \{x \mid a \leq x \leq b\}$.
$(a,\infty) = \{x \mid x > a\}$.

Ch.2. Quantification Logic (predicate logic).

§ 2.1

Quantification $\forall$ for all

$\exists$ exist one.

e.g. $U = \mathbb{N}$

$\forall n\ (n+2 \geq 0)$ T

$\forall n\ (n-2 \geq 0)$ F

$\exists n\ (n-2 \geq 0)$ T

$\forall$ and $\exists$ bind variables. (Recall: $\{x \cdots / \sum_{x=1}^{3} \cdots\}$.

english to logic:

Nobody is perfect $\neg(\exists x\ P(x))$:77 $\forall x\ \neg P(x)$

Twice an integer is an integer.

$\forall x\ (x \in \mathbb{Z} \to 2x \in \mathbb{Z})$

$\forall x \in A\ P(x)$: $\forall x\ (x \in A \to P(x))$.

$A \subseteq B$: $\forall x \in A\ (x \in B)$:

this is WRONG!

$\forall x\ \ x \in A \to x \in B$

$\forall x\ (x \in A \to x \in B)$ ← this is correct version

Every even number is a square

$\forall n\ (E(n) \to S(n))$

:77 $\forall n\ (\exists k\ n = 2k) \to (\exists m \to n = m^2))$