Informal Summary 1.4

Theorem - statement that describes a pattern or relationship among quantities or structures

Proof - justification of the truth of a theorem

Axioms - an initial set of statements

undefined terms - concepts fundamental to the context of study

At any time state an assumption, an axiom, or a previously proved result.

Replacement Rule - of used to combine the equivalences of theorems 1.1.1 + 1.2.2 to rewrite a statement involving logical connectives

Tautology Rule - at any time you may state a sentence whose symbolic translation is a tautology.

Modus Ponens - most fundamental rule of reasoning

ex. $[P \wedge (P \Rightarrow Q)] \Rightarrow Q$

Modus Ponens:

At any time after P + $P \Rightarrow Q$ appear in a proof, state that Q is true.

Direct Proof - 1st + most important way
proof method

~~Df~~ Direct Proof of $P \Rightarrow Q$

Assume P
⋮
Therefore, Q.
Thus, $P \Rightarrow Q$

Proof of Exhaustion - consists of an examination of every possible case

Ex. Let $x \in \mathbb{R}$. Prove $-|x| \leq x \leq |x|$

Case 1: suppose $x \geq 0$. Then $|x| = x$. Since $x \geq 0$, we have $-x \leq x$. Hence $-x \leq x \leq x$, which is $-|x| \leq x \leq |x|$.

Case 2
Suppose $x < 0$. Then $|x| = -x$. Since $x < 0$, $x \leq -x$. Hence, we have $x \leq x \leq -x$ or $-(-x) \leq x \leq -x$, which is $-|x| \leq x \leq |x|$.

Thus, in all cases, we have $-|x| \leq x \leq |x|$.