DR. THI DINH'S PROOF WRITING HANDBOOK
"THI'S BIBLE"

In the beginning...

Let P and Q be statement variables. When needed, suppose that $P = P(x)$ depends on a variable x. The symbol "$\forall$" means "for all" or "for any". The symbol "$\exists$" means "there exists".

Type of statement	**What we must do to prove that it is true**
(1) If P, then Q	Suppose that P is true.
(2) $\forall\, P$, Q	Prove that Q is true.
(3) $\exists\ x\ P(x)$ such that Q	Choose** x so that $P(x)$ is true.
	Prove that Q is true.

You **do not need to explain how you find x.

The first (and only) commandment

To prove that a statement is **false**, thou shalt **write out the negation of the statement and prove that.**

The five cardinal sins

- When proving any of the types of statements (1), (2), or (3):
  1. **Thou shalt not:** suppose that Q is true.
  2. **Thou shalt not:** overuse symbols and violate the rules of English grammar.†

  † You **must** write in full sentences and use symbols correctly.
- When proving a statement of the form (2) "$\forall\, P$, Q":
  3. **Thou shalt not:** "choose" or exhibit an example in place of a proof.
- When proving a statement of the form (3) "$\exists\ x\ P(x)$ such that Q":
  4. **Thou shalt not:** attempt to construct all possible x so that $P(x)$ and Q are true.
- When proving a statement **by contradiction**:
  5. **Thou shalt not:** claim a contradiction has been reached without explanation.††

  †† You **must** clearly identify the contradiction being made by making a statement of the form "P and NOT P, which is a contradiction".

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