Summary of Proofs, so far...

By contradiction :

 $P \Rightarrow \dots \Rightarrow False$

establishes that P is False, so start with the negation of the statement you want to prove

The contrapositive:

If you want to prove a statement of the form $P \Rightarrow Q$ and you get stuck going from "left to right", then consider the contrapositive $TQ \Rightarrow P$

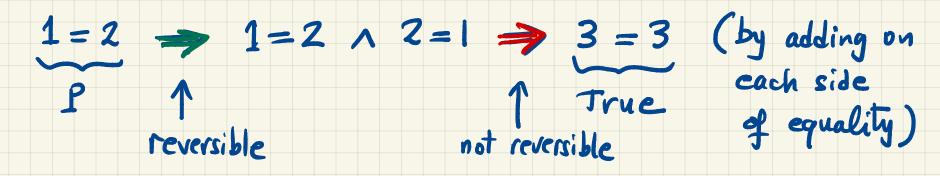
Note: Both techniques require the skill of being able to negate a statement.

Direct proof:

If you want to prove P is true, start with some R that you know is true, and prove $R \Rightarrow P$

Warning: If you want to prove *P* is true, and you start with *P* and reach something you know is true, that's <u>not</u> a proof P⇒ ⇒ True does not establish P is true unless all implications can be reversed.

Example: Prove 1=2



Example: Prove Va, b > 0, a+b > Vab

is this reversible? Yes if $a_{i}b \ge 0$ $a+b \ge \sqrt{ab} \iff a+b \ge 2\sqrt{ab} \implies (a+b)^{2} \ge 4ab$ $\iff a^{2}+b^{2}+2ab \ge 4ab \iff a^{2}+b^{2}-2ab \ge 0$ $\iff (a-b)^{2} \ge 0$ True Here, all implications are reversible