Types of proofs	Want to show	How to show it
Direct proof	$p \to q$	Assume p is true. Derive a chain of implications which in the end proves that q is true.
Indirect proof (Proof by contrapositive)	$p \to q$	Prove $\neg q \to \neg p$ with direct proof
Proof by contradiction	p	Show $\neg p \to F$
	$p \to q$	Show $p \wedge \neg q \to F$
Proof by cases	$(p_1 \vee p_2 \vee \dots \vee p_n) \to q$	Show $\underbrace{(p_1 \to q)}_{\text{case 1}} \wedge (p_2 \to q) \wedge \dots \wedge (p_n \to q)$
Proof of equivalence	$p \leftrightarrow q$	Show $(p \to q) \wedge (q \to p)$
	$p \leftrightarrow q \leftrightarrow r$	Show $(p \to q) \wedge (q \to r) \wedge (r \to p)$
For-all proof	$\forall x: P(x)$	Prove $P(x)$ for an arbitrary x
		Induction
Counterexample	$\neg \forall x: P(x)$	Find x for which $P(x)$ is false
Existence proof	$\exists x: P(x)$	**Constructive:** Find an x such that $P(x)$ is true.
		Non-constructive: Show that $P(x)$ is true for some x without finding it.