

Proof strategies

Week 4 . Deep dive.

ABCS

- Assumptions (write them down)
- Break down the assumptions
 - $E \wedge, E \rightarrow, E \leftrightarrow$
 - Sometimes $E \vee$ (though this can be tricky to identify)
- Conclusion (what's the main connective?)
 - $I \sim, I \rightarrow, I \vee, I \wedge$
- Stuff in the middle (trial and error)
 - Start with non-hypothetical rules
 - Then try out hypothetical rules

Table 4-1 Proof Strategies

<i>If the conclusion is a(n):</i>	<i>Then do this:</i>
Atomic formula	If no other strategy is immediately apparent, hypothesize the negation of the conclusion for $\sim I$. If this is successful, then the conclusion can be obtained after the $\sim I$ by $\sim E$.
Negated formula	Hypothesize the conclusion without its negation sign for $\sim I$. If a contradiction follows, the conclusion can be obtained by $\sim I$.
Conjunction	Prove each of the conjuncts separately and then conjoin them with $\&I$.
Disjunction	Sometimes (though not often) a disjunctive conclusion can be proved directly simply by proving one of its disjuncts and applying $\vee I$. Otherwise, hypothesize the negation of the conclusion and try $\sim I$.
Conditional	Hypothesize its antecedent and derive its consequent by $\rightarrow I$.
Biconditional	Use $\rightarrow I$ twice to prove the two conditionals needed to obtain the conclusion by $\leftrightarrow I$.

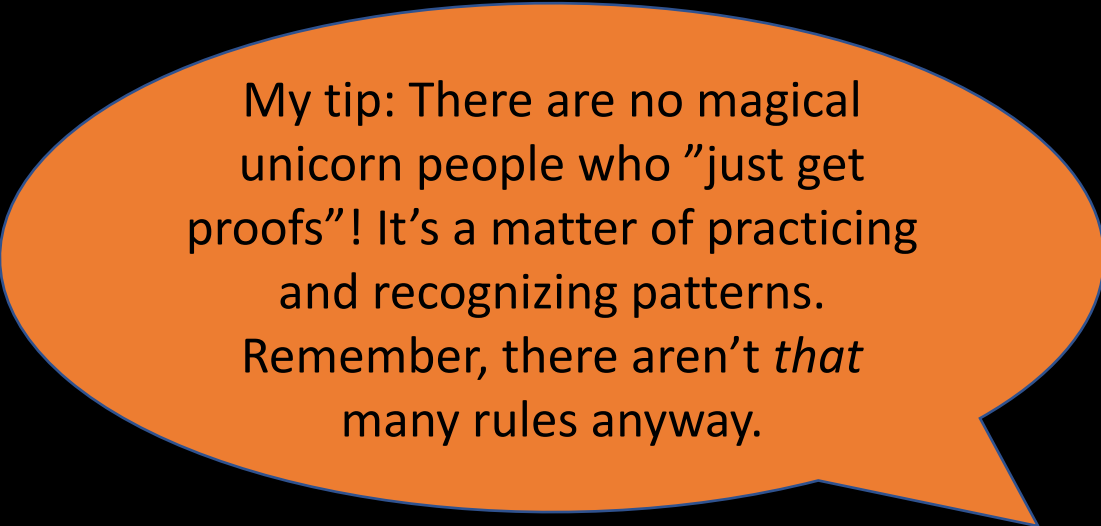
How *for all* x puts it:

Working backward from what you want.

- What does working backwards from each connective involve?
Which connective is easiest to work backwards from? Hardest?

Work forward from what you have.

- What does working forward from each connective involve?
Which connective is easiest to work forward from? Hardest?



My tip: There are no magical unicorn people who "just get proofs"! It's a matter of practicing and recognizing patterns. Remember, there aren't *that* many rules anyway.