

# Strategies for Natural Deductive Proofs: Propositional Logic

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Given a set of premises,  $\Delta$ , and the goal you are trying to prove,  $\Gamma$ , there are some simple rules of thumb that will be helpful in finding ND proofs for problems. These are not complete, but will get you through our problem set. Here goes:

Given  $\Delta$ , prove  $\Gamma$ :

1. Apply premises,  $p_i \in \Delta$ , to prove  $\Gamma$ .
2. If you need to use a  $\vee$ -premise, then apply  $\vee$ -e and prove  $\Gamma$  for each disjunct.
3. Otherwise, work backwards from the type of goal you are proving:
  - (a) If the goal  $\Gamma$  is a conditional ( $A \rightarrow B$ ), then assume  $A$  and prove  $B$ ; use  $\rightarrow$ -i rule.
  - (b) If the goal  $\Gamma$  is a negative ( $\neg A$ ), then assume  $\neg\neg A$  and prove contradiction; use  $\neg$ -i rule.
  - (c) If the goal  $\Gamma$  is a conjunction ( $A \wedge B$ ), then prove  $A$  and prove  $B$ ; use  $\wedge$ -i rule.
  - (d) If the goal  $\Gamma$  is a disjunction ( $A \vee B$ ), then prove one of  $A$  or  $B$ ; use  $\vee$ -i rule.