

# Methods of Proof

Chapter 7, second half.

# Proof methods

- Proof methods divide into (roughly) two kinds:

Application of inference rules:

Legitimate (sound) generation of new sentences from old.

- Resolution
- Forward & Backward chaining

Model checking

Searching through truth assignments.

- Improved backtracking: Davis--Putnam-Logemann-Loveland (DPLL)
- Heuristic search in model space: Walksat.

# Normal Form

We like to prove:

$KB \models a$   
equivalent to :  $KB \wedge \neg a$  unsatisfiable

We first rewrite  $KB \wedge \neg a$  into conjunctive normal form (CNF).

A "conjunction of disjunctions"

$$(A \vee \neg B) \wedge (B \vee \neg C \vee \neg D)$$

Clause

Clause

literals

- Any KB can be converted into CNF.
- In fact, any KB can be converted into CNF-3 using clauses with at most 3 literals.