# WALKSAT

CSE 511A: Introduction to Artificial Intelligence



# INFERENCE ALGORITHMS

Generally, four ways to check for entailment:

- Brute-force model checking
- Resolution
- Forward chaining
- Backward chaining



# BACKWARD CHAINING

- High-level idea of inference by backward chaining:
  - Just like resolution, prove that the KB + negation of query is unsatisfiable
  - Instead of checking for unsatisfiability using modes ponens like in resolution, check for unsatisfiability using algorithms like DPLL
  - Find if there are any assignment of truth values that satisfies all clauses in the KB + negation of query
    - If there is one possible assignment, then query is not entailed
    - If there are no possible assignments, then query is entailed



# WALKSAT

- High-level idea of inference by backward chaining with WalkSAT:
  - Identical to backward chaining with DPLL, except that it checks for unsatisfiability using a local search algorithm called WalkSAT instead of DPLL
  - Find if there are any assignment of truth values that satisfies all clauses in the KB + negation of query
    - If there is one possible assignment, then query is not entailed
    - If there are no possible assignments found thus far, then no conclusions can be made

# WALKSAT

WalkSAT (*clauses*, *prob*, *maxFlips*)

(1) *model* = random truth value assignment to all symbols in *clauses*
(2) loop for *maxFlips* iterations
  (2)(a) return true if all *clauses* are true with *model*
  (2)(b) *clause* = random clause that is false with *model*
  (2)(c) with probability *prob*, flip value of a random symbol in *clause*
  (2)(d) else flip whichever symbol in *clause* that maximizes the number of satisfied clauses
(3) return *false*