

What if you really need to solve an NP-COMplete problem.

3-SAT

• Strategy 1: There are 2^n possible assignments.
Check each one.

Time $O(2^n)$

• Strategy 2: Schönning's Algorithm (Local Search)

1. Guess a soln
 2. Pick a clause that is not satisfied
 3. Flip value of one variable in that clause
 4. Repeat from step 2, A times.
 5. Repeat
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After $O\left(\left(\frac{4}{3}\right)^n\right)$ steps, finds a solution if one exists with high probability

Let z_{old} be assignment before variable is flipped
 z_{new} " " after " "

Q: Which is always true of the new z ?

- A) z_{new} satisfies more clauses than z_{old}
- B) z_{new} satisfies clause k ←
- C) A & B are both always true
- D) Neither A nor B is true

Clause is only not satisfied
 if all 3 variables are
 false, so flipping one will make
 true

z_{new} can satisfy fewer clauses than z_{old} ! Why

Strategy to Solve NP Problem: convert to 3SAT
 solve using Schöning's Alg. Time $O\left(\left(\frac{4}{3}\right)^n\right)$