

Reduction from (3)SAT to ILP
↓
integer.

For each boolean variable in the SAT formula, define a ILP variable.

$$x \rightarrow x' \quad y \rightarrow y' \quad z \rightarrow z'$$

One constraint for each clause.

$$\max \pm x'$$

$$(1-x') + y' + (1-z') \geq 1$$

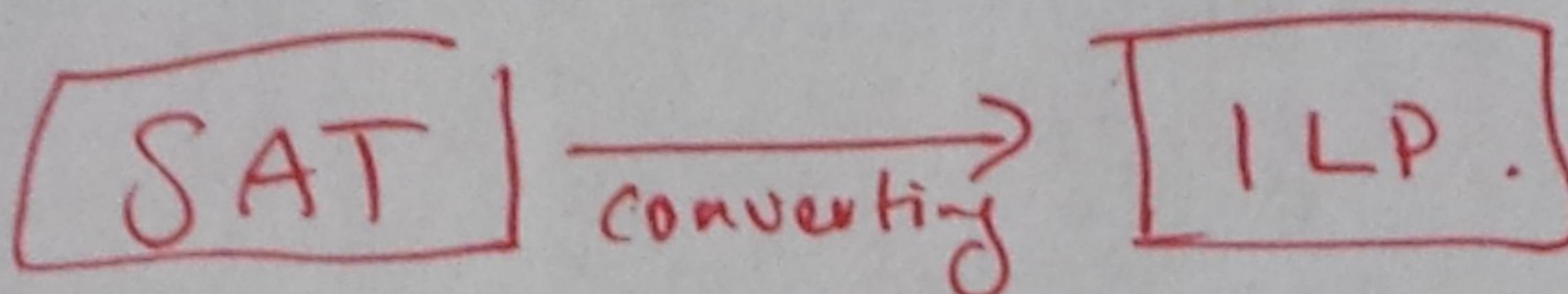
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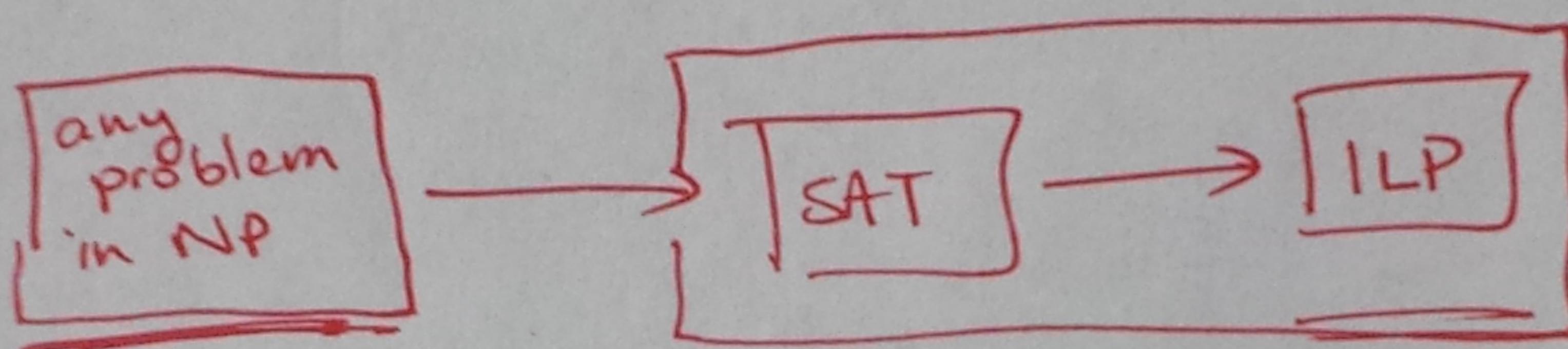
$$x', y', z' \in \{0, 1\}$$

If there is a sat. assign. to the formula, then there is a feasible soln to the ILP problem.
And vice versa.



SAT reduces to ILP. \Rightarrow ILP is NP-hard

is NP-hard \rightarrow every problem in NP reduces to SAT.



\therefore every problem in NP reduces to ILP
 \Rightarrow ILP is NP-hard.

\Rightarrow ILP is unlikely to have a poly time algorithm
efficient algorithm
practical.

\Rightarrow ILP does not have a poly time alg.
unless $P = NP$.

If A reduces to B and B reduces to C
then A reduces to C.

"reduces to" \rightarrow "poly time reduces to"