Reduction from (3)SAT to ILP
$\downarrow$
integer.

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

$x \to x'$ $\quad y \to y'$ $\quad z \to z'$

One constraint for each clause.

$$\max \sum x'$$

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

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

If there is a sat. assign. to the formula, then there is a feasible sol^{n} to the ILP problem.
And vice versa.

$\boxed{\text{SAT}} \xrightarrow[\text{converting}]{} \boxed{\text{ILP.}}$

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

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

$\boxed{\text{any problem in NP}} \longrightarrow \boxed{\boxed{\text{SAT}} \longrightarrow \boxed{\text{ILP}}}$

$\therefore$ every problem in NP reduces to ILP.
$\Rightarrow$ ILP is NP-hard.
$\Rightarrow$ ILP is unlikely to have a $\underbrace{\text{poly time algorithm}}_{\text{efficient algorithm, practical.}}$

$\Rightarrow$ 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"