

$\exists x, y \in \mathbb{Q}$

mid  $x$

$\rightarrow \underline{x} \leq 5 + y$  ✓

$x - y > 7$

$x + y > 9$

$\rightarrow \underline{x} > 7 + y$

$\rightarrow \underline{x} < 9 - y$

$7 + y < \underline{x} \leq 5 + y$

\*  $7 + y > 5 + y \Rightarrow 7 > 5$

\*  $7 + y < 9 - y$

\*  $7 + y > 9 - y$



$$y > 5 \quad \{y \mapsto 6\}$$

$$t[y] < x < t[y]$$

$$\underbrace{(t[y])(y \rightarrow 6)} < x < \underbrace{(t[y])(y \rightarrow 6)}$$

$$\exists \begin{matrix} q_1 \in \mathbb{Q} \\ x \rightarrow \end{matrix} \left( \frac{q_2 - q_1}{2} \right) \in \mathbb{Q} \quad \begin{matrix} q_2 \in \mathbb{Q} \\ 5 \end{matrix}$$

$$LRA \in P$$

$$LIA \in NP$$

$$\frac{5-3}{2} \rightarrow 1$$



Proportional class  $\forall \epsilon \in \mathbb{N}$

~~$\exists P, C_i \in \mathbb{N} = m$~~

~~$\exists P, D_j \in \mathbb{N}$~~

Eliminate  $P$

$|C_i \cup D_j| = O(m^2)$

$\leq m$

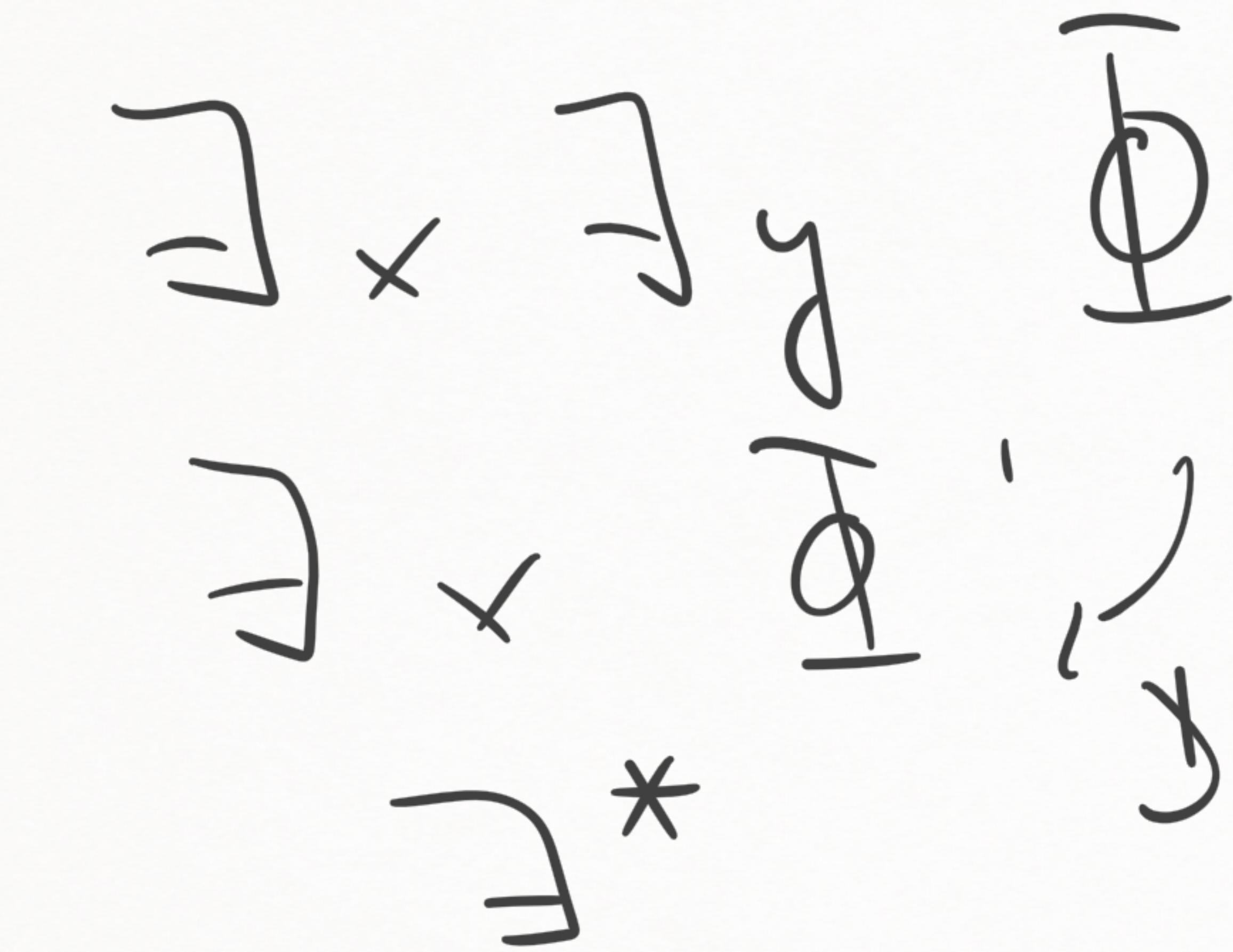
Variable Elimination

$\forall x \rightarrow P(x) \cup P(f(x))$

$P \notin (C_i) \quad P \cup P \cup C_i$   
 ~~$P \cup D_j$~~   
 $P \notin (D_j)$

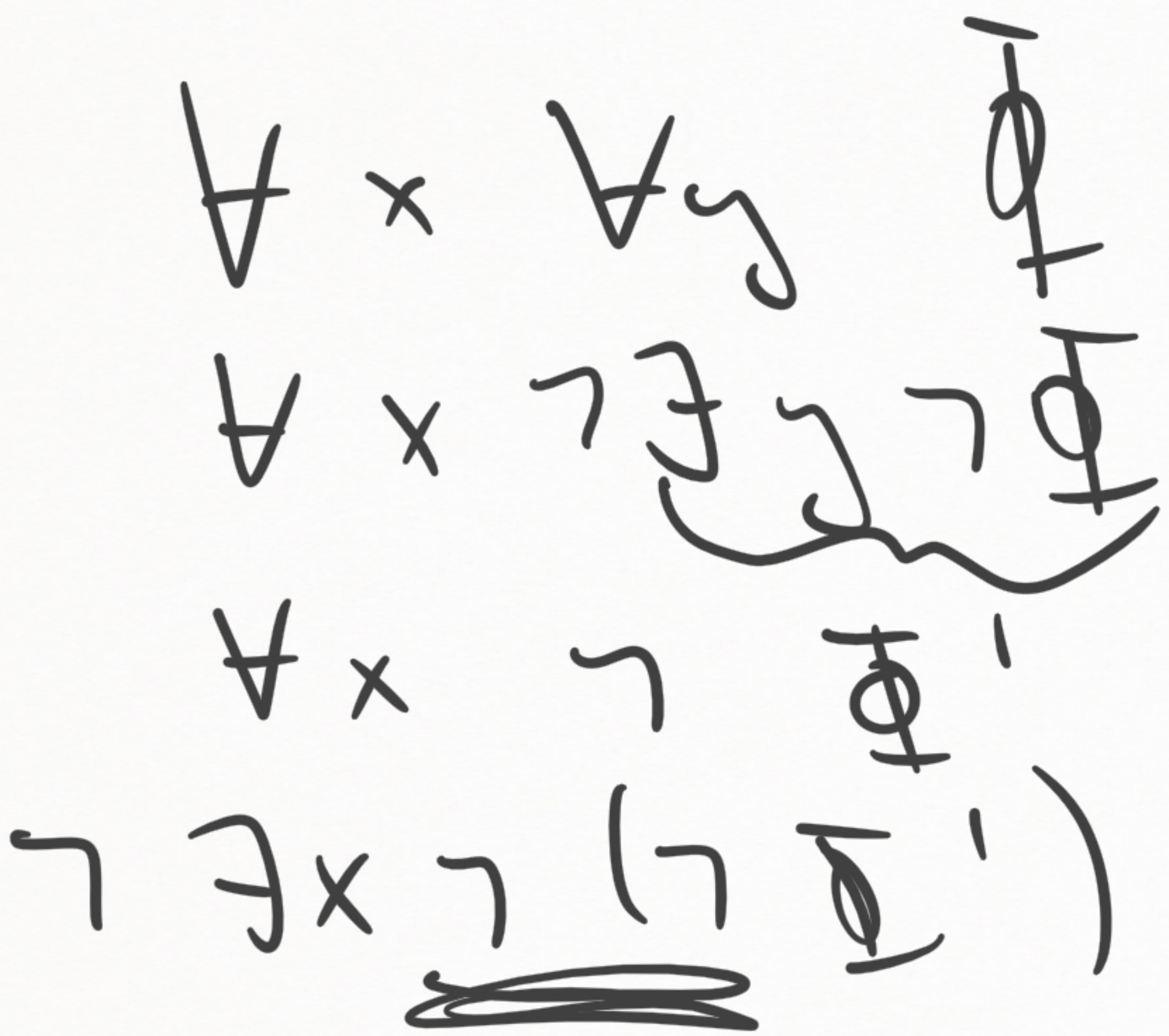


$\Phi$  is DNF



no exp blow-up because  
any DNF

no quantifier after nodes,  
can x complexity





$\forall \exists$

$\forall x_i \exists y_i \Phi$

( $\Phi$  without functions)

decidable

$\exists x_i \forall y_i \Phi$

"

$\forall x_i \exists y_i \forall x_j \exists y_j \Phi$

undecidable



