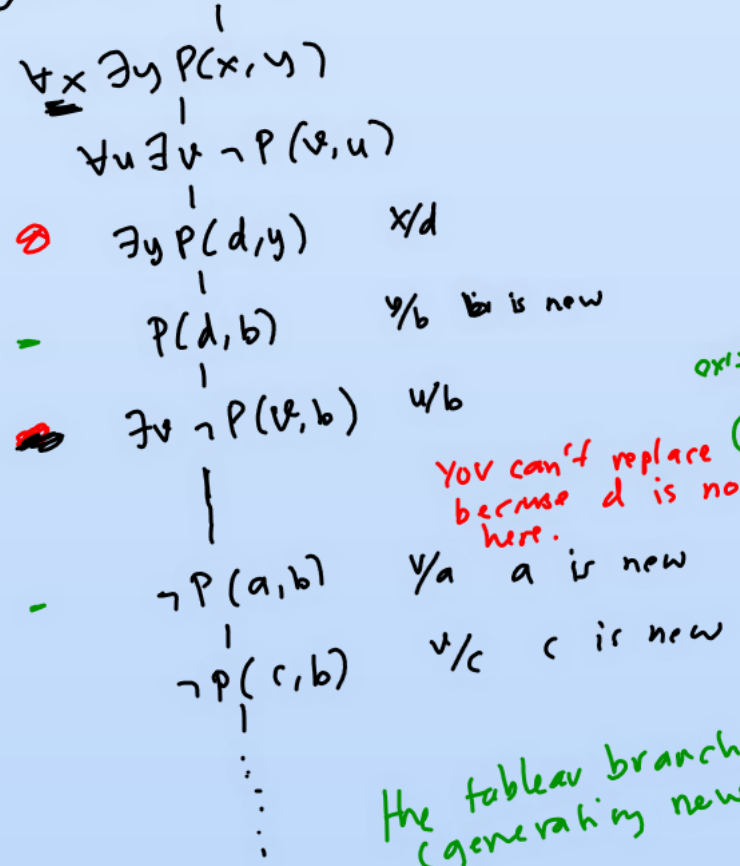


$$\forall x \exists y P(x, y) \stackrel{?}{\models} \exists u \forall v. P(v, u)$$

To show the entailment, we show that:  
 $\forall x \exists y P(x, y) \wedge \neg \exists u \forall v. P(v, u)$  is unsatisfiable.

$$\forall x \exists y P(x, y) \wedge \forall u \exists v \neg P(v, u)$$



existentially quantified  
 You can't replace  $v$  with  $d$  because  $d$  is no longer new here.

The tableau branch is infinite.  
 (generating new constants indefinitely)

$$\neg \forall x F \sim \exists x \neg F$$

$$\neg \exists x F \sim \forall x \neg F$$

$$F \models G$$

$\Leftrightarrow F \rightarrow G$  is a tautology

$\Leftrightarrow F \wedge \neg G$  is unsatisfiable.