12-1-2020

Construction of a First Order Logic Theorem Prover

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Supplemental video was originally displayed within the final presentation slide.

Construction of an Automated Theorem Prover

Luke Tyler

Uniform Notation – α-formulas

α	α_1	α_2
$X \wedge Y$	X	Y
$\neg(X \vee Y)$	$\neg X$	$\neg Y$
$\neg(X \rightarrow Y)$	X	$\neg Y$

Uniform Notation – β-formulas

β	β_1	β_2
$\neg(X \wedge Y)$	$\neg X$	$\neg Y$
$X \vee Y$	X	Y
$X \rightarrow Y$	$\neg X$	Y

Uniform Notation – γ-formulas

γ	$\gamma(\mathbf{u})$
$\forall$ x. Y	Y {x/**u**}
¬($\exists$ x. Y)	Y {x/**u**}

Uniform Notation – δ-formulas

δ	δ(t)
$\neg(\forall x.\ Y)$	$Y\ \{x/t\}$
$\exists x.\ Y$	$Y\ \{x/t\}$

$$\neg(P \rightarrow Q),\ Q \lor R \vdash P \land R$$

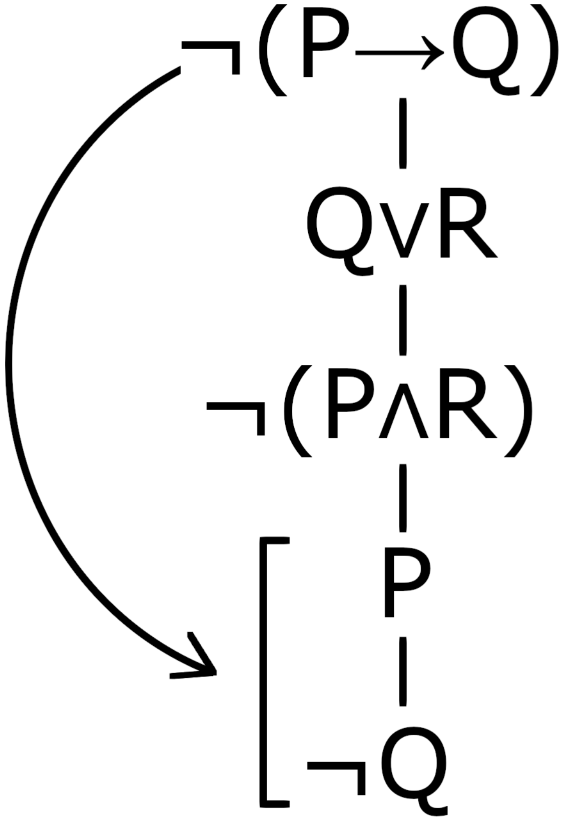
$\neg(P \rightarrow Q)$

|

$Q \vee R$

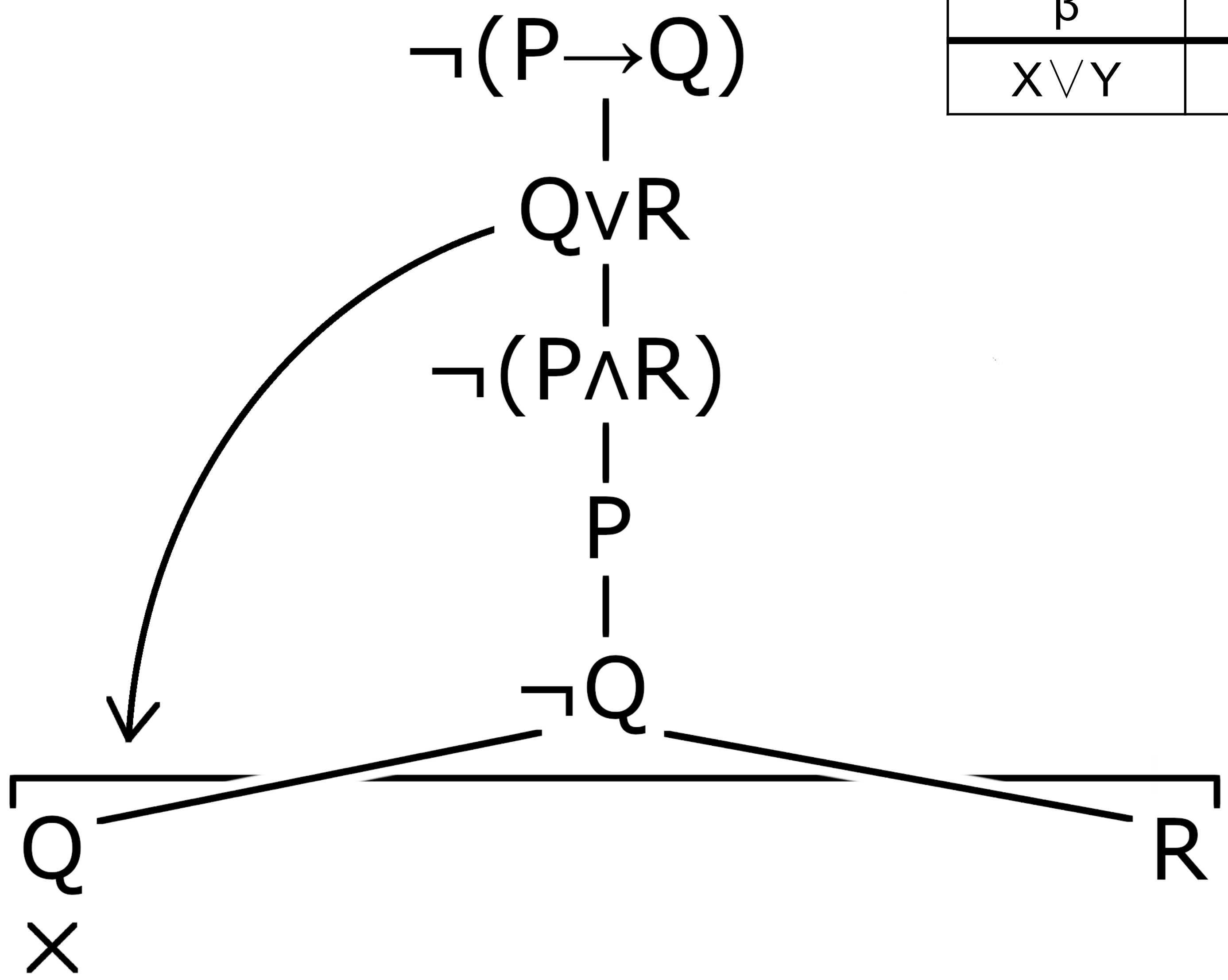
|

$\neg(P \wedge R)$

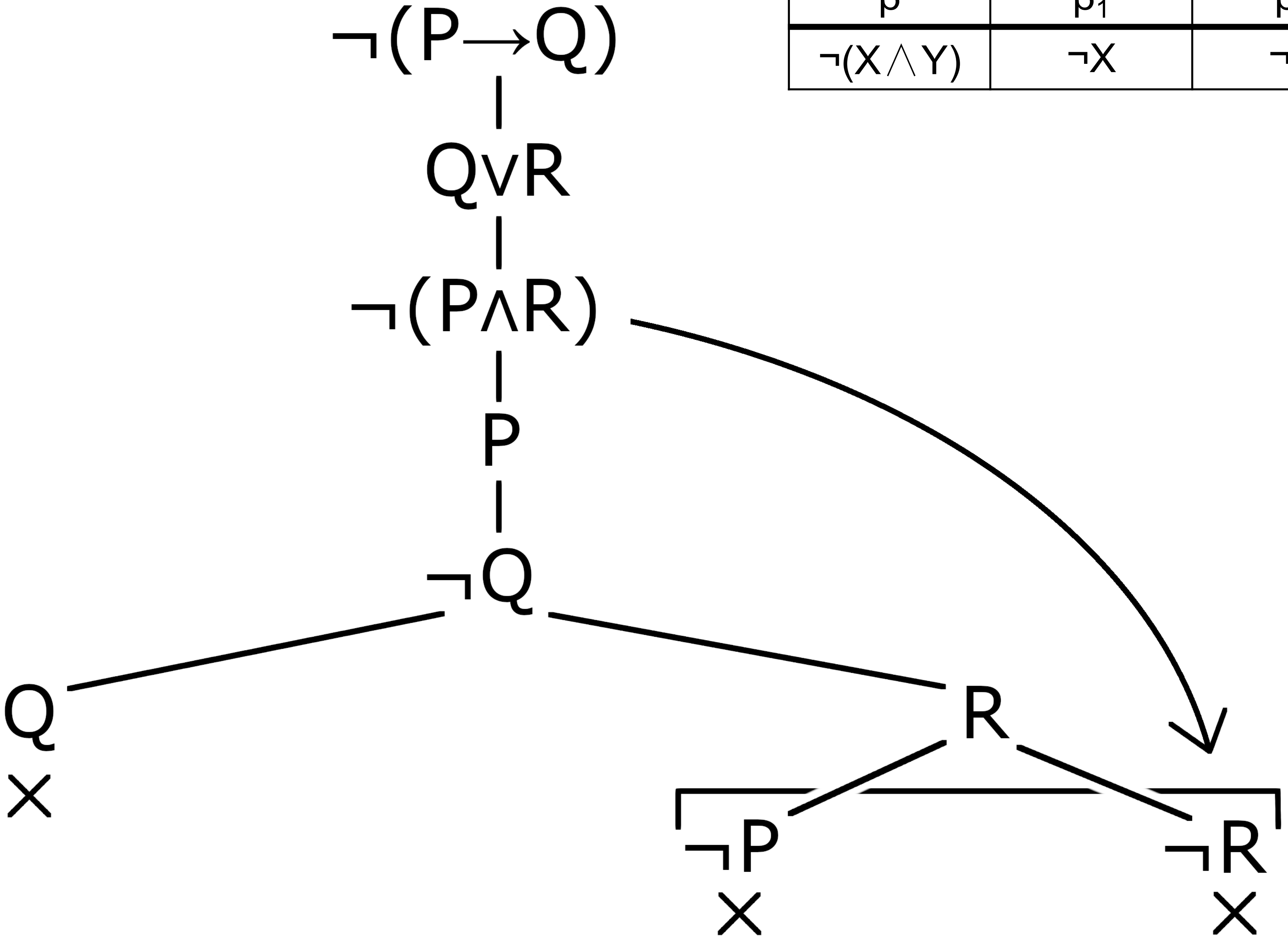


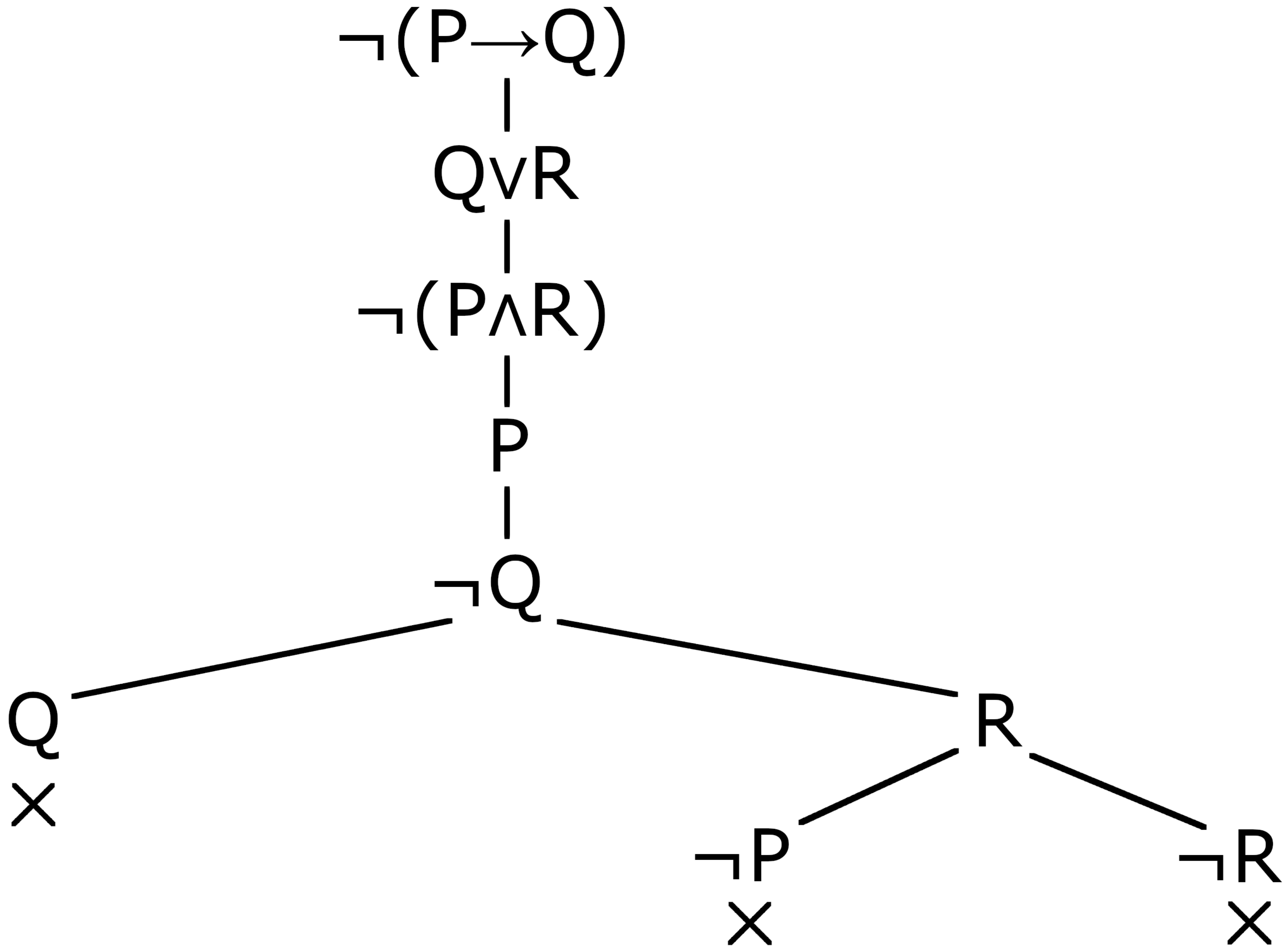
α	α_1	α_2
¬(X→Y)	X	¬Y

β	β_1	β_2
$X \vee Y$	X	Y



β	β_1	β_2
$\neg(X \wedge Y)$	$\neg X$	$\neg Y$




¬(P→Q)
Q∨R
¬(P∧R)
P
¬Q
Q
×
R
¬P
×
¬R
×

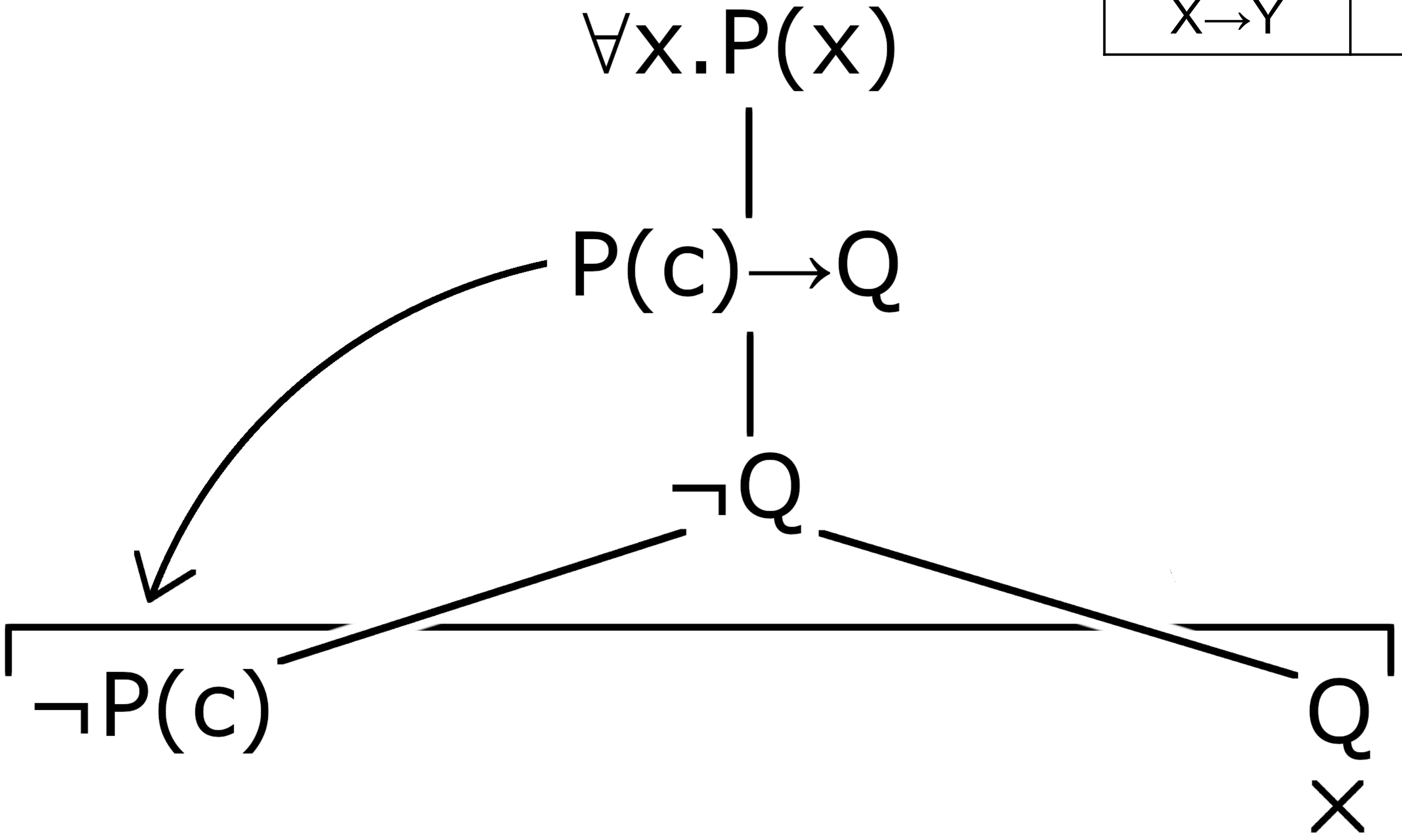
$$\forall x.P(x),\ P(c) \to Q \vdash Q$$

$$\forall x.P(x)$$

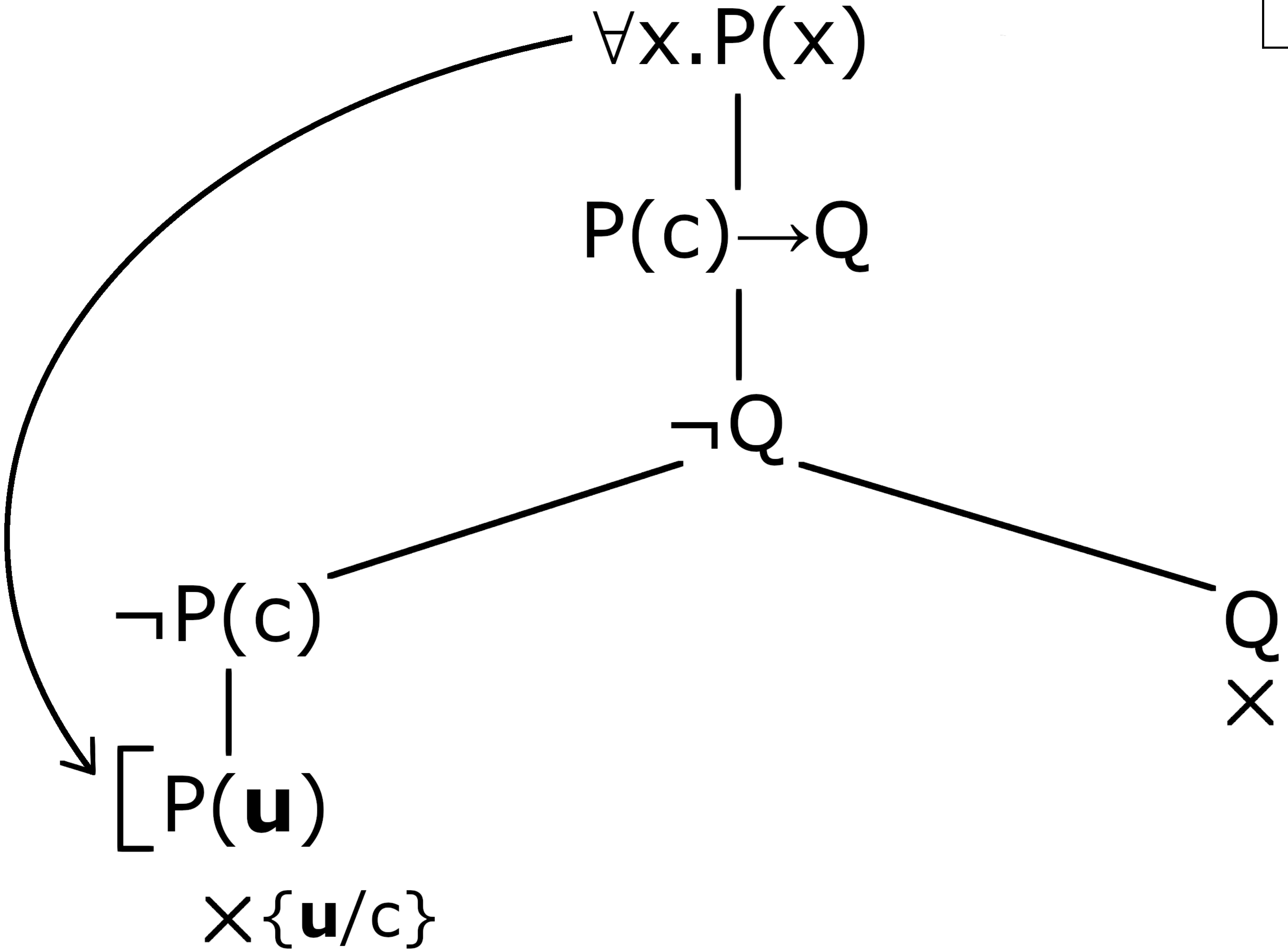
$$P(c) \rightarrow Q$$

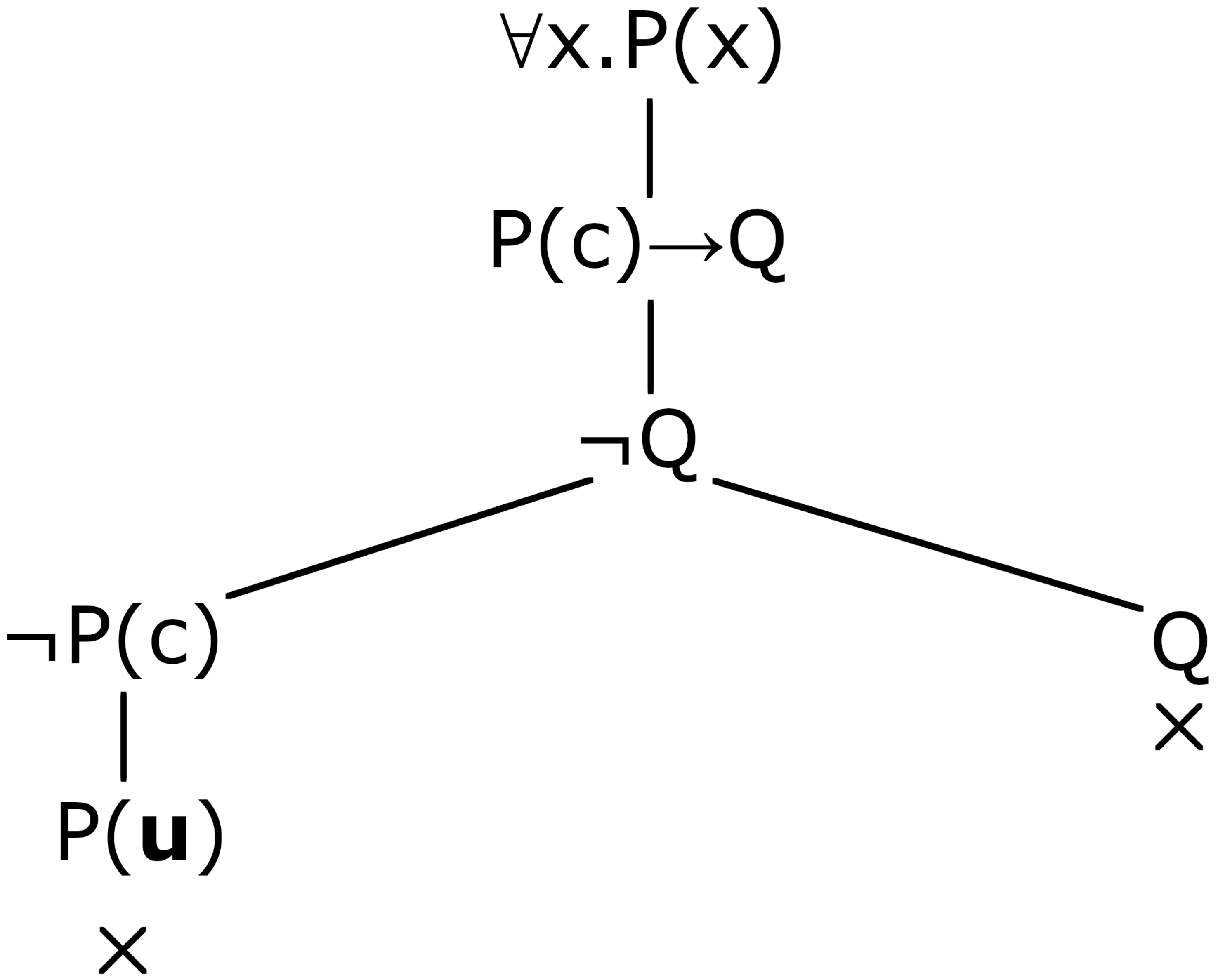
$$\neg Q$$

β	β_1	β_2
X→Y	¬X	Y



γ	γ($\mathbf{u}$)
∀x. Y	Y {x/$\mathbf{u}$}




∀x.P(x)
P(c)→Q
¬Q
¬P(c)
Q
×
P(**u**)
×