

Rules for semantic trees

We can use all rules for PropLog in PredLog as well.

In addition, there are the following rules concerning quantifiers and the identity symbol.

<p>Universal:</p> <p>(U) $\forall\alpha A$ $A(\tau/\alpha)$</p> <p>A is any open formula containing the variable α, and $A(\tau/\alpha)$ is the sentence we obtain if we replace α by <i>any</i> name τ.</p>	<p>Example: $\forall x(Fx \rightarrow Gx)$ $Fa \rightarrow Ga$</p>
<p>Existential:</p> <p>(E) $\exists\alpha A$ $A(\tau/\alpha)$</p> <p>A is any open formula containing the variable α, and $A(\tau/\alpha)$ is a sentence we obtain if we replace α by <i>any</i> name τ that <i>has not occurred thus far</i>. <i>(Comment. An existential only claims the existence of some object, not of some specific.)</i></p>	<p>Example: $\exists xFx$ Fa</p> <p>(“a” is a name that has not occurred in the tree thus far.)</p> <p>Intuitive motivation: “Let’s call the thing we talk about in ‘$\exists xFx$’ ‘a’; then, we get Fa.” This is only allowed if we have not made any particular <i>further assumption about that thing “a”</i>. Therefore, “a” must not occur in the tree thus far.</p>
<p>Negated universal:</p> <p>(NU) $\neg\forall\alpha A$ $\exists\alpha\neg A$</p>	<p>Example</p> <p>$\neg\forall xFx$ $\exists x\neg Fx$</p>
<p>Negated existential:</p> <p>(NE) $\neg\exists\alpha A$ $\forall\alpha\neg A$</p>	<p>Example</p> <p>$\neg\exists xFx$ $\forall x\neg Fx$</p>
<p>Identity:</p> <p>(I) Φ Φ $\alpha=\beta$ $\beta=\alpha$ Ψ Ψ</p> <p>where the name (designator) α occurs in the sentence Φ, and Ψ is the result of replacing one or more occurrences of α in Φ by β.</p>	<p>Example</p> <p style="text-align: right;">Fa $a=b$ Fb</p>

Rules for closing a branch:

Any branch containing both Φ and $\neg\Phi$, where Φ is a sentence, closes.

Any branch containing $\neg\alpha=\alpha$ ($\alpha\neq\alpha$), where α is a name, closes.