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Rule Induction:

Rule induction is like mathematical induction – except rather than inducting over the natural numbers, you induct over the strings in S.

There are two uses of rule induction:

- Showing that all strings in an inductively defined set satisfy a property
- Showing that a set S is a superset of an inductively defined set I

Showing a property is satisfied:

Lets say that we wish to prove all strings in an inductively defined set I satisfy a property P.

To do this we show that every axiom of I satisfies the property P.

We then show that if all strings in the hypothesis satisfy P then all strings which can be derived by any rule of I also satisfy P.

IE if $\frac{u}{aub}$ is a rule then we would show that $P(u) \implies P(aub)$

We must do this for every rule.

This proves that a property is satisfied for every string I in an inductively defined set using Rule Induction.

Showing $I \subseteq S$:

To show that a set S is a superset of an inductively defined set I, we show that the axioms of I are in S and all conclusions that can be drawn from those axioms are also in S.

IE if I has axiom $\frac{}{a}$ and rule $\frac{u}{aub}$, showing that $a \in S$ and $\forall u \in I.u \in S \implies aub \in S$ would show that $I \subseteq S$.