

Some Examples

Prove $\Gamma \Rightarrow A$ where $A = \exists x(\text{dead}(x))$ and $\Gamma =$:

$$\forall x \forall y ((\text{bug}(x) \wedge \text{jar}(y) \wedge \text{in}(x, y) \wedge \text{heated}(y)) \Rightarrow \text{dead}(x)) \\ \text{heated}(tj) \wedge \text{bug}(tb) \wedge \text{jar}(tj) \wedge \text{in}(tb, tj)$$

Some Examples

Sometimes, as in the last example, it is possible to extract an *answer substitution*. Sometimes it's not. Consider:

$$(p(a) \vee p(b)) \Rightarrow \exists x(p(x))$$

$$\exists x(p(x)) \Rightarrow \exists x(p(x))$$

Some Examples

Here is an example where we will need to refer to a clause a number of times and pick different substitutions.

Suppose a list is constructed from the empty list, *nil*, and the *cons* operator.

- An item is in a list if it is the element at the front of the list (i.e. the left argument of the top-level *cons*).
- An item is in a list if it is in the tail of the list (the right argument of the top-level *cons*).

Some Examples

Show that 3 is in the list $[1,2,3,4]$.

Show that 3 is not in the list $[1,2,4]$.