Some Examples

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

$$\forall x \forall y((bug(x) \wedge jar(y) \wedge in(x, y) \wedge heated(y)) \Rightarrow dead(x))$$

$$heated(tj) \wedge bug(tb) \wedge jar(tj) \wedge in(tb, tj)$$

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].