

Lab 8

Date
Page

~~Example 1~~

Statement: "If all cats are mammals, all mammals are warm-blooded, and Whiskers is a cat, then Whiskers is warm-blooded."

Step 1: FOL Representation

Break statement into premises and represent them in First Order Logic.

1. All cats are mammals:

$$\forall x (Cat(x) \rightarrow Mammal(x))$$

~~$\forall x (Cat(x) \rightarrow Mammal(x))$~~

~~(For all x , if x is a cat, then x is a mammal)~~

2. All mammals are warm blooded

$$\forall x (Mammal(x) \rightarrow WarmBlooded(x))$$

(For all x , if x is a mammal, then x is warm blooded)

3. Whiskers is a cat:

$$Cat(Whiskers).$$

Step 2: Reasoning & Deduction

1. From Premise 1 ($\forall x(\text{cat}(x) \rightarrow \text{Mammal}(x))$) and $\text{Cat}(\text{Whiskey})$, we use modus ponens to deduce

$\text{Mammal}(\text{Whiskey})$

(Since Whiskey is a cat & all cats are mammals, Whiskey is a mammal.)

2. From Premise 2 ($\forall x(\text{Mammal}(x) \rightarrow \text{WarmBlooded}(x))$) and $\text{Mammal}(\text{Whiskey})$, we again use modus ponens to deduce:

$\text{WarmBlooded}(\text{Whiskey})$

(Since Whiskey is a mammal & all mammals are warm blooded.)

Step 3: Conclusion

From the 3 premises

We have logically deduced $\text{WarmBlooded}(\text{Whiskey})$

\therefore Whiskey is warm blooded

Explanation of Key Concepts:

1. Universal Quantification (\forall): Expresses that the premises apply to all entities.

2. Modus ponens: Applied twice to deduce intermediate conclusions.

Output: Whiskers is a cat
Whiskers is a mammal
Whiskers is warm blooded