

## Lab-8 (First Order Logic)

steps

1. same predicate symbol: The predicate symbols in the expressions must match.
2. same number of arguments: The expressions must have an equal no of arguments.
3. variable conflict resolution: variables can't take multiple conflicting values.
4. No conflicting function symbols: different function symbols can't unify.

Expressions

1.  $\text{Knows}(b(x,y), g(x))$
2.  $\text{Knows}(f(\text{Alice}, \text{Bob}), g(z))$

Steps:

1. Compare Predicates  
both are  $\text{Knows}$ , so proceed to unify the arguments.
2. Compare Arguments:

L Arguments 1:  $b(x, y)$  vs  $b(\text{Alice}, \text{Bob})$   
substitute:  $x = \text{Alice}$  (since  $x = \text{Alice}$ )  
 $x = \text{Alice}, y = \text{Bob}$

Argument 2:  $g(x)$  vs  $g(z)$ :

Argument 2:  $g(x)$  vs  $g(z)$ :  
substitute:  $z = \text{Alice}$  (since  $x = \text{Alice}$ )

L3. Final substitution

$\Rightarrow x = \text{Alice}$

$y = \text{Bob}$

$z = \text{Alice}$

4. Unified Expression:

Knowns ( $b(\text{Alice}, \text{Bob})$ ,  $g(\text{Alice})$ )

Bob  
Alice

G H J K L : " enter

3/12/24

Lab - 8

To prove Robert is a criminal

- As per the law, it is a crime for an American to sell weapons to hostile nations

American(a)  $\wedge$  weapon(p)  $\wedge$  sells(a, p, R)  
 $\wedge$  Hostile(R)  $\Rightarrow$  Criminal(R)

→ Country A, an enemy of America

• Enemy(A, American)

→ country A, has missiles all sold by Robert

$\forall \alpha \text{ missile}(\alpha) \wedge \text{owns}(A, \alpha) \Rightarrow \text{sells}$

(A,  $\alpha$ , Robert)

By Elimination,

• missile( $T_1$ )

• owns(A,  $T_1$ )

→ American citizen

American(Robert)

step 1: facts having no implications

Alpha-Beta

Enemy(A, America)

American  
Robert

missle(T<sub>1</sub>)

ownsCA, T<sub>1</sub>)

weapon(x)

sellsCA, x, Robert)

Hostile(A)

American  $\wedge$  Hostile(A)  $\wedge$  sells(A, x, Robert)

$\wedge$  weapon(x)

$\Rightarrow$  Criminal(Robert)