1. **UNIFICATION IN FOL**

**INPUT:**

def unify(x, y, subst):

"""

Unifies two terms x and y, returning a substitution.

Args:

x: The first term.

y: The second term.

subst: The current substitution.

Returns:

A substitution that unifies x and y, or None if unification fails.

"""

if isinstance(x, str) and x.islower():

# x is a variable

if (x, y) not in subst:

subst[(x, y)] = True

return subst

elif subst[(x, y)]:

return subst

else:

return None

elif isinstance(y, str) and y.islower():

# y is a variable

if (y, x) not in subst:

subst[(y, x)] = True

return subst

elif subst[(y, x)]:

return subst

else:

return None

elif x == y:

# x and y are identical

return subst

elif isinstance(x, list) and isinstance(y, list):

# x and y are lists

if len(x) != len(y):

return None

else:

for i in range(len(x)):

s = unify(x[i], y[i], subst.copy())

if s is None:

return None

subst.update(s)

return subst

else:

return None

# Example usage

subst = {}

x = ['P', 'x', 'y']

y = ['P', 'a', 'f(x)']

result = unify(x, y, subst)

if result:

print("Unification successful!")

print("Substitution:", subst)

else:

print("Unification failed.")

**OUTPUT:**

