**Exercises/Chapter 2 - Unification and Proof Search**

**2.3 Exercises**

**2.1**

Which of the following pairs of terms unify? Where relevant, give the variable instantiations that lead to successful unification.

1. bread = bread

true.

1. 'Bread' = bread

false.

1. 'bread' = bread

true.

1. Bread = bread

true.

Bread = bread.

1. bread = sausage

false.

1. food(bread) = bread

false.

1. food(bread) = X

true.

X = food(bread).

1. food(X) = food(bread)

true.

X = bread.

1. food(bread,X) = food(Y,sausage)

true.

X = sausage.

Y = bread.

1. food(bread,X,beer) = food(Y,sausage,X)

false.

X can't be both sausage and beer at the same time.

1. food(bread,X,beer) = food(Y,kahuna\_burger)

false.

arities don't match.

1. food(X) = X

false.

infinite recursion.

1. meal(food(bread),drink(beer)) = meal(X,Y)

true.

X = food(bread).

Y = drink(beer).

1. meal(food(bread),X) = meal(X,drink(beer))

false.

X can't be both food(bread) and drink(beer) at once.

**2.2**

We are working with the following knowledge base:-

house\_elf(dobby).

witch(hermione).

witch(’McGonagall’).

witch(rita\_skeeter).

magic(X):- house\_elf(X).

magic(X):- wizard(X).

magic(X):- witch(X).

Which of the following queries are satisfied? Where relevant, give all the variable instantiations that lead to success.

1. ?- magic(house\_elf).

false. house\_elf is a functor.

magic(dobby) would be true!

1. ?- wizard(harry).

false. We don't know anything about Harry, and no fact refers to wizard.

1. ?- magic(wizard).

false.

1. ?- magic('McGonagall').

true. witch('McGonagall'). and magic(X):- witch(X). combine.

Actually false - due to wizard() reference:-

ERROR: magic/1: Undefined procedure: wizard/1

1. ?- magic(Hermione).

true. Hermione = dobby.