3) Unification

**Unification occurs between two structures with no variables**

a = a.
a = b.
location(apple, kitchen) = location(apple, kitchen).
location(apple, kitchen) = location(pear, kitchen).
a(b,c(d,e(f,g))) = a(b,c(d,e(f,g))).
a(b,c(d,e(f,g))) = a(b,c(d,e(g,f))).

**Unification occurs between a variable and a primitive**

X = a.
4 = Y.

**Multiple variables are simultaneously bound to values.**

location(apple, kitchen) = location(apple, X).
location(X,Y) = location(apple, kitchen).
location(apple, X) = location(Y, kitchen).

**Prolog uses '_nn,' where 'n' is a digit, to represent unbound variables.**

X = Y.
location(X, kitchen) = location(Y, kitchen).

**Prolog remembers the fact that the variables are bound together and will reflect this if either is later bound.**

X = Y, Y = hello.
X = Y, a(Z) = a(Y), X = hello.
X = Y, Y = 3, write(X).

2) **Write a program to solve the Monkey Banana problem.**

Imagine a room containing a monkey, chair and some bananas. That has been hanged from the centre of ceiling. If the monkey is clever enough he can reach the bananas by placing the chair directly below the bananas and climb on the chair .The problem is to prove the monkey can reach the bananas. The monkey wants it, but cannot jump high enoughfrom the floor. At the window of the room there is a box that the monkey can use. The monkey can perform the following actions:

-1)Walk on the floor.
2)Climb the box.
3)Push the box around (if it is beside the box).
4)Grasp the banana if it is standing on the box directly under the banana

Can the Monkey reach the Banana?

**3) Convert to Clauses and Formulate the query.**

Y is female;

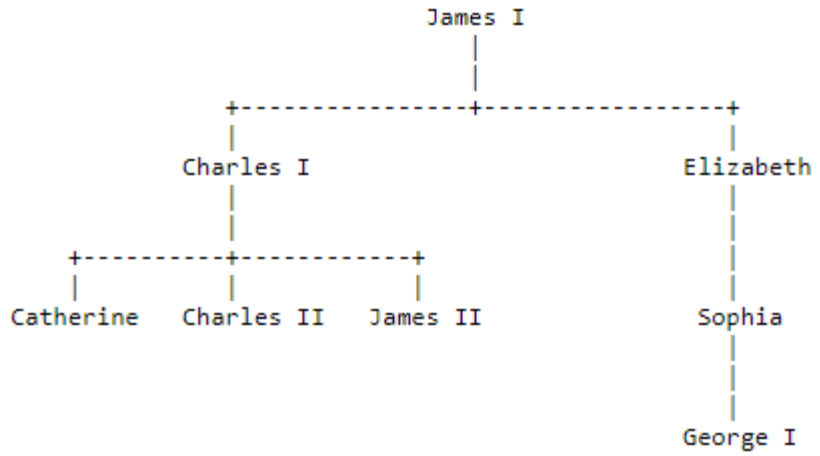
Y has father M and mother F;
X has the same father M and mother F.
Barts parents are homer and marge
Lisas parents are homer and marge
Lucys parents are homer and marge
Who is the sister of Bart?

**4)**

**a. Represent the clauses.**

**b. Express the following rules:**

**M is the mother of X if she is a parent of X and is female**
**F is the father of X if he is a parent of X and is male**
**X is a sibling of Y if they both have the same parent.**




**d. Formulate the following queries:**

Was George I the parent of Charles I?
Who was Charles I's parent?
Who were the children of Charles I?

**5) Write a prolog program to find at least one path in the following graph where a is start state and c is the goal.**