Unification and Resolution

The following are pen-and-paper exercises.

Question 1. Write down the steps taken by the unification algorithm for each of the following pairs of terms. If the algorithm succeeds then write down the MGU and the corresponding common instance.

1. $f(X, f(X, Y)) \stackrel{?}{=} f(f(Y, a), f(U, b))$

2. $f(g(U), f(X, Y)) \stackrel{?}{=} f(X, f(Y, U))$

3. $h(U, f(g(V), W), g(W)) \stackrel{?}{=} h(f(X, b), U, Z)$

Question 2. Consider the following variant of the network connections problem.

```
% addr(X,Y) = X holds the address of Y
% serv(X) = X is an address server
% conn(X,Y) = X can initiate a connection to Y
% twoway(X,Y) = either end can initiate a connection

addr(a,d).
addr(a,b).
addr(b,c).
addr(c,a).

serv(b).

conn(X,Y):- addr(X,Y).
conn(X,Y):- addr(X,Z), serv(Z), addr(Z,Y).

twoway(X,Y):- conn(X,Y), conn(Y,X).
```

Draw the complete SLD-tree for this program together with the goal

```
?- twoway(W,a).
```