COMP4415 Assignment 10 – 2003
Due: Wed June 25

1. (4 marks) Consider the following set of Horn clauses. Show that this set is unsatisfiable, using Using SLD resolution with leftmost literal selection rule, depth first search and top to bottom choice of clauses to resolve against. Show only those branches constructed up to and including the first successful branch. (You may indicate the clauses from the input set used at each step by number, rather than displaying the clause itself.)

$$
\begin{array}{rl}
1: & R \wedge T \rightarrow A \\
2: & B \rightarrow A \\
3: & S \wedge U \rightarrow R \\
4: & W \rightarrow R \\
5: & \top \rightarrow B \\
6: & D \rightarrow S \\
7: & \top \rightarrow W \\
8: & \top \rightarrow Q \\
9: & S \rightarrow V \\
10: & U \rightarrow V \\
11: & \top \rightarrow U \\
12: & A \wedge Q \wedge V \rightarrow \bot
\end{array}
$$

2. (1 mark) What happens ot the previous problem if we add the clause $R \rightarrow T$ as the last clause?

3. (5 marks) Consider the following logic program.

```
swap(leaf(X),leaf(X)).
swap(node(X,Y,Z), node(X,Z1,Y1)) :- swap(Y,Y1),swap(Z,Z1).
```

   Carefully draw the SLD tree produced from the goal

   $\texttt{swap}(\texttt{node}(\texttt{a}, \texttt{node}(\texttt{b}, \texttt{leaf}(\texttt{c}), \texttt{leaf}(\texttt{d})), \texttt{node}(\texttt{e}, \texttt{leaf}(\texttt{f}), \texttt{leaf}(\texttt{g}))), \texttt{X}) \rightarrow \bot$

   At each step, apply the resolution algorithm to compute the most general unifier, and show your working. (Remember to use fresh variables whenever you create a new copy of a clause in the program to resolve against the current goal.) Compute the answer substitution.