Knowledge Based Systems (CM0377) 2001/2
Tutorial Example for 'Lecture 7'

The following question is an extract from the 2000/2001 examination paper:

Consider the following program *P:*

```
father_of(jim, john).
same_family(jim, john).
same_family(X, Y):- same_family(Y, X).
```

and the following clause *C:*

```
same_family(john, jim)
```

(i) Use proof by refutation to prove *C* from *P.*

(ii) What is the *Herbrand Universe* of *P?*

(iii) What is the *Herbrand Base* of *P?*

(iv) Determine which *Herbrand Interpretations* of *P* are *models* of *P*.

HINT for part (iv): there are certain elements of the Herbrand Base of *P* that must *obviously* be assigned to **true** in any model of *P.* Also, there are some *father_of* atoms where whether they are assigned to **true** or no in some interpretation makes no difference to whether the interpretation is a model of *P.* Determine these first before exploring the combinations of truth value assignments for the other elements of the Herbrand Base that, in combination with these obvious assignments, comprise models of *P.*

(v) Hence show that:

- *C* is a logical consequence of *P,* and
- The clause:

```
same_family(jim, jim)
```

is *not* a logical consequence of *P*

(Last modified 4th March 2002)