

## PHL451 – Prolog Exercise

In order to complete these exercises please use the SWISH prolog app available at:

<https://swish.swi-prolog.org>

Cut and past the following program in to the program area of the SWISH interface:

```
female(pam).  
female(liz).  
female(ann).  
female(pat).  
male(tom).  
male(bob).  
male(jim).  
parent(pam,bob).  
parent(tom,bob).  
parent(tom,liz).  
parent(bob,ann).  
parent(bob,pat).  
parent(pat,jim).
```

(a) Once you have loaded the program pose the following queries:

```
?- female(ann).  
?- female(jim).  
?- parent(X,bob).  
?- parent(tom,X).  
?- parent(X,ann),parent(X,pat).
```

What are the answers to these queries? Beware, for some queries here might be more than one answer. To get all the answers type a ';' and carriage return at the question mark.

(b) Now, using the parent predicate formulate the following Prolog queries:

1. Who is Pat's parent?
2. Does Liz have a child?
3. Who is Pat's grandparent?

(c) Given the above facts, extend the program by writing rules defining the following predicates:

sister(X,Y) -- X is the sister of Y.

son(X,Y) -- X is the son of Y.

father(X,Y) -- X is the father of Y.

grandmother(X,Y) -- X is the grandmother of Y.

ancestor(X,Y) -- X is an ancestor of Y.

(Hint: this predicate might come in handy: different(X,Y):- not(X=Y). Some predicate definitions might be **recursive**.)

Demonstrate that your program works by posing the following queries:

4. ?- sister(X,pat).
5. ?- sister(X,Y).
6. ?- son(jim,X).
7. ?- father(X,bob).
8. ?- grandmother(X,ann).
9. ?- ancestor(X,jim).

Hand in the source code of your prolog program and a proof of the program execution.