Assignment #10: Prolog Basics

In order to complete these exercises you will need to install prolog from swi-prolog.org.

Write a Prolog program by creating a file with you favorite **program** editor like Notepad++ that contains the following facts:

- here the predicate `parent(X,Y)` means X is the parent of Y
- you can also copy/paste or download the following database from the course website

```
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) Load this file into Prolog, usually this is done with the *consult file predicate*:

```
?- consult('<filename>').
```

On Windows you can load the fact database with the menu point File→Consult. SWI-Prolog also overloads a bare string list by consulting each item in the list: `['family_tree.pl'].` will work. 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**.)

Add these rules to your existing file and attach the file to your submission

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.

For each of parts a, b, and c, you should include screenshots of the relevant contents of the SWI-Prolog cosole. Part c additionally requires you to attach your .pl file.