Exercises Nov. 4 (S1) and Nov. 7 (S2)

Suppose you have access to the following PROLOG clauses (you can download the file `family.pl` from the course home page):

```
1  male(X)        /* X is male */
2  female(X)      /* X is female */
3  parent(X,Y)    /* X is a parent of Y */
4  diff(X,Y)      /* X and Y are different */
```

1. Using the clauses above, write definitions of the following clauses:

   ```
   1   father(X,Y)    /* X is the father of Y */
   2   mother(X,Y)    /* X is the mother of Y */
   3   sibling(X,Y)   /* X and Y are siblings */
   4   sisters(X,Y)   /* X and Y are sisters */
   5   is_father(X)   /* X is a father */
   6   is_mother(X)   /* X is a mother */
   7   is_sibling(X)  /* X is a sibling */
   8   is_brother(X)  /* X is a brother */
   9   grandpa(X,Y)   /* X is a grandfather of Y */
   10  uncle(X,Y)     /* X is an uncle of Y */
   11  cousin(X,Y)    /* X and Y are cousins */
   12  ancestor(X,Y)  /* X is an ancestor of Y */
   ```

   Note that `diff(X,Y)` *should be used on variables that are instantiated.*

2. Try to produce all the answers of `is_father(X)`. (using either a or ; repeatedly). Does the same answer occur multiple times? Explain!

3. Explain how the rule `diff(X,Y)` from the above exercise works. How would the rule change if \== ("not equal") were replaced by \= ("not unifiable")? Try it!

Hint! You can use the built-in predicate `trace.` *to enable debugging. Use* `notrace.` *to turn it off again.*