Homework 1

1. (Thieves) Consider the following example:

```
thief(john).
likes(mary,food).
likes(mary,wine).
likes(john,X):-likes(X,wine).
may_steal(X, Y):-
          thief(X), likes(X, Y).
```

   Explain how the query

```
?-may_steal(john, X).
```

   is executed by Prolog. Try it out in SWI-Prolog.

2. Suppose someone has already written Prolog clauses that define the following family relationships:

```
father(X, Y) /* X is the father of Y */
mother(X, Y) /* X is the mother of Y */
male(X)      /* X is male */
female(X)    /* X is female */
parent(X, Y) /* X is a parent of Y */
diff(X, Y)   /* X and Y are different */
```

   Write Prolog clauses to define the following relationships:

```
is_mother(X)        /* X is a mother */
is_father(X)        /* X is a father */
is_son(X)           /* X */
sister_of(X, Y)     /* X is a sister of Y */
siblings(X, Y)      /* X is a sibling of Y */
```

   Write a Prolog program that describes a family tree you know (e.g. your own). Define rules for family relations. Ask questions about your family.

3. Here's an anecdote attributed to Mark Twain:

   "After long years as a bachelor I was tired of being alone and married a widow with a grown daughter. My father fell in love with the daughter and took her as his wife. This made me my own son-in-law and my stepdaughter became my mother. After a year my wife gave birth to a son. Now, my son was my father's brother-in-law and at the same time my uncle, since he was my stepmother's brother. But my father's wife also gave birth to a son. So this was my brother and also my grandson, since he was the son of my daughter. This meant I'd married my grandmother, since she was the mother of my mother. As my wife's husband, I was also her grandson. And since the husband of a grandmother is always a grandfather, I am my own grandfather."

   Use Prolog to verify its claim is possible.