Práctica 1: Introduction to Prolog

Ex 1. The list is a simple data structure widely used in Prolog. A list is a sequence of any number of items written in prolog as [item1, item2, ..., itemn]. The first item is called the head and the remaining part of the list is called the tail. A list can be specified by its head and its tail as [Head | Tail], for instance [1,2,3] can be written as [1 | [2,3]]. Write the following predicates (programs):

(1) miembro(X,Y) meaning item X is a member of List Y. The program can be based on the observation: X is a member of Y if either (a) X is the head of Y, or (b) X is a member of the tail of Y.
(2) anade(X,Y,Z) meaning Z is the list resulting of adding X to the list Y.
(3) quita(X,Y,Z) meaning Z is the list resulting of removing X from the list Y.
(4) concatena(X,Y,Z) meaning Z is the list resulting of concatenating X and Y.
(5) sublista(X,Y) meaning X is a sublist of Y (you may use your predicate for concatena).

Test each program with a few queries, e.g. concatena([1,2,3],[a,b,c],X).

Ex 2. There is a street with three neighboring houses that all have a different color. They are red, blue, and green. People of different nationalities live in the different houses and they all have a different pet (a jaguar, a snail, and a frog). Here are some more facts about them:

- The Englishman lives in the red house.
- The jaguar is the pet of the Spanish family.
- The Japanese lives to the right of the snail keeper.
- The snail keeper lives to the right of the blue house.

Define a predicate solution(Street) that helps you find out who lives where. To solve this task you first have to come up with a suitable way of representing streets and houses.

Hint: Represent the street as a list of three elements: Street = [House1,House2,House3]. Represent each house as a complex term of the form house(Color,Nationality,Pet). Use the predicates miembro and sublista to state the necessary constraints about the houses in the street.

Ex 3. Write a program in Prolog for solving a mini sudoku. A mini sudoku is a Squire of 4x4, where each column must include the numbers 1 to 4 (without repetitions). Similarly for the rows and corners of the square. Your program should be something like:

```prolog
solution :-
    sudoku(A1,A2, A3,A4, B1,B2, B3,B4, C1,C2, C3,C4, D1,D2, D3,D4),
    print([A1,A2,A3,A4,B1,B2,B3,B4,C1,C2,C3,C4,D1,D2,D3,D4]).
```

Where the sudoku predicate instantiate the variables A1,...,D4 satisfying the sudoku constraints, and the print predicate displays the solution in a legible form.

Submitting your answer

The práctica can be solved in teams of two people (1 submission for team). Submission is by email (to rafael.ramirez@upf.edu), the subject of the email must be Práctica 1- nombre1 apellido1- nombre2 apellido2, and the message body should contain the programs for 1) the exercises and 2) some tests to your programs. Deadline is the beginning of your next Práctica. Late submissions may have a penalty.