

## CS224 – Lab 5

**Purpose:** Logic programming in Prolog looks and feels different than other programming languages since you write logical rules and then make queries given those rules. This lab gives an introduction to the language.

**Knowledge:** This lab will help you become familiar with the following content knowledge:

- Basic Prolog relations and queries
- Prolog terms for creating data structures

**Task:** Follow the steps in this lab carefully to complete the assignments.

### Assignment 1:

Terms in prolog can be used to create data structures. We will use a term `node(X,L,R)` to represent a binary search tree with root value of `X` and left and right subtrees `L` and `R` respectively. Recall that for a binary search tree, all the values in the left subtree are less than the root value and all the values in the right subtree are greater than the root value. Also the left and right subtrees are both binary search trees.

Write a relation `membst` which determines whether a value `K` is a member of a binary search tree.

**Criteria for Success:** Test your relation with the following queries:

```
membst(3,node(5,node(3,nil,nil),node(7,nil,nil))).
```

```
membst(6, node(5,node(3,nil,nil),node(7,nil,nil))).
```

The first search should succeed and the second one should fail.

### Assignment 2:

Write a relation which may be used to find the last item in a list.

**Criteria for Success:** Test your relation with the following queries:

```
last1([1],X).
```

```
last1([1,2,3],X).
```

```
last1(X,5).
```

### Assignment 3:

Section 19.10 in the Webber text describes "What Prolog is Good For" with an example of a little puzzle. Read this section and copy the file `~jillz/cs224/manwolf.pl` and complete exercise 21 on p412.

**Criteria for Success:** You should get only distinct solutions when solving the puzzle.

**Assignment 4:**

Section 20.6 in the text describes "The Lighter Side of Prolog" with an example of a little text-based adventure game. Read this section which describes the predicates `assert` and `retract`. Copy the file `~jillz/cs224/game.pl` and complete exercise 6 on p444. Enjoy!

**Criteria for Success:** You have a working game that includes the gate, key, and lightening strike.

Submit your files in Canvas for grading.