

# Virtual Machines

## Exercise Sheet 11

Deadline: 8 July 2008, during lecture, by email, or in room 02.07.041

### Exercise 1: Clause Indexing

7 Points

Take a look at the following predicate  $p/2$ . Which alternatives can be excluded by inspecting the first argument  $X$ ? Show the different **try chains** considering the possible values of  $X$ .

```
p(X,Y) <- X=a.  
p(X,Y) <- q(Y),X=b.  
p(X,Y) <- r(X,Y).  
p(X,Y) <- X=f(Y).  
p(X,Y) <- Y=a,r(Y,Y).
```

### Exercise 2:

3 Points

Assume given definitions of two predicates  $p/1$  and  $q/1$ . Use the cut operator to define a predicate  $r/1$  such that  $r(X)$  holds exactly when either  $p(X)$  or  $q(X)$  holds, but not both.

### Exercise 3:

10 Points

Consider the predicate  $remove/3$  in which the third parameter is obtained from the second parameter, which is a list, by removing all occurrences of the first parameter. (e.g.  $remove(2, [1, 2, 3, 2, 5], [1, 3, 5])$ )

- Define this predicate using the cut operator.
- Translate this predicate, together with the query  $remove(a, [b, a, c], Z)$ , to WiM code.
- Execute the WiM code showing the sequence of (sub-)goals that are called and the stack and the heap after each of these goals has been processed. Where is backtracking done?