

## Logic Programming: Small exercises

Write PROLOG programs for the following problems:

### Exercise

1. Define the Factorial (i.e.  $\text{fact}(n) = 1 * 2 * 3 * \dots * (n-1) * n$ )

```
fact(0,1).  
fact(N,R):- N1 is N-1, fact(N1,R1), R is R1*N.
```

A version where also the opposite direction is working (i.e.  $\text{fact}(N,120)$ ):

```
fact(0,1).  
fact(N,R):- fact(N1,R1), N is N1+1, R is R1*N.
```

2. The Fibonacci sequence  $f(1), f(2), f(3), \dots$  is: 1, 1, 2, 3, 5, 8, 13, 21, 34, 55..... As you see the definition is easy to grasp:

$$f(1) = f(2) = 1$$
$$f(n) = f(n-2) + f(n-1), \text{ if } n \geq 3$$

```
fib(1,1).  
fib(2,1).  
fib(N,R):- N >= 3, N1 is N-1, N2 is N-2,  
           fib(N1,R1), fib(N2,R2), R is R1+R2.
```

3. Write rules which finds a path in a graph

```
arc(a,b).      arc(b,c).  
arc(a,c).      arc(a,d).  
arc(b,e).      arc(e,f).  
arc(b,f).      arc(f,g).
```

```
path(X,Y):- arc(X,Y).  
path(X,Y):- arc(X,Z), path(Z,Y).
```

4. Compute the Maximum of two numbers X and Y.

```
max(X,Y,X):- X >= Y.  
max(X,Y,Y):- Y > X.
```

5. Compute the absolute value of a number X.

```
abs(X,X):- X >= 0.
```

`abs(X,Y):- X =< Y, Y is -X.`

