Logic Programming: Small exercises

Write PROLOG programs for the following problems:

Exercise

1. Define the Factorial (i.e. fact(n) = 1 * 2 * 3 * … * (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. fact(N,120)):

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

2. The The Fibonacci sequence f(1), f(2), f(3),.. is: 1, 1, 2, 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), if n >= 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.
   ```

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

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