Programare logica

Laborator 04

28.10.2020

Aplicatii Prolog

1. Calculul pentru factorial $n!$, $n \in N$.

$n! = 1 \cdot 2 \cdot 3 \cdot \ldots \cdot n = n(n-1)!$; $0! = 1$ $\Rightarrow$ $\begin{cases} a_0 = 1 \\ a_n = n \cdot a_{n-1} \end{cases}$

Notatie: $a_n = n!$

- Program Prolog

```
predicates
    factorial(integer, real)
clauses
    factorial(0,1).
    factorial(N, RF) :- N1=N-1, factorial(N1, RF1), RF = N*RF1.
```

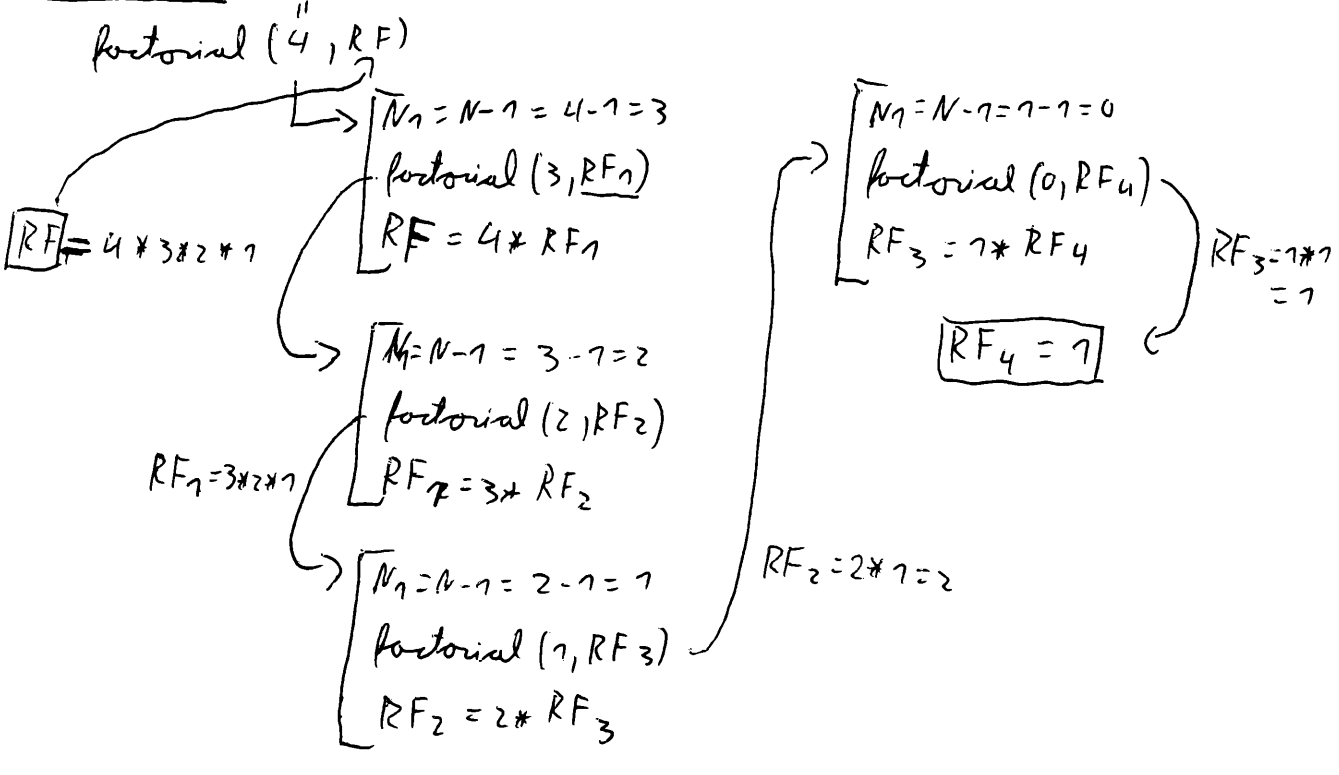
Executie: factorial(5, Rezultat - factorial).

- In SWI Prolog

```
factorial(0,1).
factorial(N,RF) :- N1 is N-1, factorial(N1,RF1), RF is N* RF1
```

Observatie:

factorial(4, RF)



2. Șirul Fibonacci : $\boxed{F_n = F_{n-1} + F_{n-2}}$, $F_0 = 0$, $F_1 = 1$.

n	F_n
0	0
1	1
2	1
3	2
4	3
5	5
6	8
7	13
8	21
9	34
10	55
11	89
12	144

Program SWI Prolog

```
fibonacci(0,0)
fibonacci(1,1)
fibonacci(N,RF):- N1 is N-1, N2 is N-2,
                  fibonacci(N1,RF1),
                  fibonacci(N2,RF2),
                  RF is RF1+RF2.
```

Execuție:

```
fibonacci(11, Rezultat_fibonacci).
```

1'. Să se determine valoarea șirului $\boxed{c_n = 7 \cdot c_{n-1} + 1}$, $c_0 = -2$.

$a_n = n * a_{n-1}$, $a_0 = 1$

Program SWI Prolog

```
sirC(0,-2).
sirC(N,RC):- N1 is N-1, sirC(N1,RC1), RC is 7*RC1+1.
```

Execuție:

```
sirC(3, Rezultat_sir)
```

2'. Să se determine valoarea șirului h_n unde $h_n = 2h_{n-1} + 3h_{n-2} + 1$, $h_0 = -1$, $h_1 = 2$.
(a b c)

$F_n = F_{n-1} + F_{n-2}$

Program Prolog

```
predicates
  sirh(integer, real)
clauses
  sirh(0,-1)
  sirh(1,2)
  sirh(N,RH):- N1 is N-1, N2 is N-2, sirh(N1,RH1), sirh(N2,RH2),
               RH is 2*RH1 + 3*RH2 + 1
```

Execuție

```
sirh(4, Rezultat_sirh)
```

2") Să se determine valoarea primului termen din $\boxed{h_n = a \cdot h_{n-1} + b \cdot h_{n-2} + c}$,
$a, b, c \in \mathbb{Z}$, $h_0 = -1$, $h_1 = 2$. $RH = a \cdot RH_1 + b \cdot RH_2 + c$

Program Prolog

```
predicates
    sirh (integer, integer, integer, integer, real)
           a       b       c       N      RH

clauses
    sirh(_,_,_,0,-1).
    sirh(_,_,_,1,2).
    sirh(A,B,C,N,RH):- N1 is N-1, N2 is N-2, sirh(A,B,C,N1,RH1),
                       sirh(A,B,C,N2,RH2), RH is A*RH1+B*RH2+C.
```

Executie

```
sirh(3,7,2,4, Rezultat_sirh).
```

Cerinte Temă

1) $b_n = 3b_{n-1} + 2$, $b_0 = -2$.

2) Şirul f_n: $2f_{n+1} = 4f_n - f_{n+2}$ cu $f_0 = -1$, $f_1 = 2$.