

A Simple Factorial Program

[1] **factorial(0, 1).**

[2] **factorial(N , $Fact$) :- M is $N - 1$,
factorial(M , FM), $Fact$ is $N * FM$.**

?- **factorial(3, A).** [2] $N_1 \rightarrow 3$, $A \rightarrow Fact_1$

M_1 is **3-1**, **factorial(M_1 , FM_1), $Fact_1$ is $3 * FM_1$.** [is] $M_1 \rightarrow 2$

factorial(2, FM_1), $Fact_1$ is $3 * FM_1$. [2] $N_2 \rightarrow 2$, $FM_1 \rightarrow Fact_2$

M_2 is **2-1**, **factorial(M_2 , FM_2), $Fact_2$ is $2 * FM_2$, $Fact_1$ is $3 * FM_1$.**
[is] $M_2 \rightarrow 1$

factorial(1, FM_2), $Fact_2$ is $2 * FM_2$, $Fact_1$ is $3 * FM_1$.
[2] $N_3 \rightarrow 1$, $FM_2 \rightarrow Fact_3$

M_3 is **1-1**, **factorial(M_3 , FM_3), $Fact_3$ is $1 * FM_3$,**
 $Fact_2$ is $2 * FM_2$, $Fact_1$ is $3 * FM_1$. [is] $M_3 \rightarrow 0$

factorial(0, FM_3), $Fact_3$ is $1 * FM_3$, $Fact_2$ is $2 * FM_2$,
 $Fact_1$ is $3 * FM_1$. [1] $FM_3 \rightarrow 1$

$Fact_3$ is $1 * 1$, $Fact_2$ is $2 * FM_2$, $Fact_1$ is $3 * FM_1$. [is] $Fact_3 \rightarrow 1$

?- factorial(3, A). [2] $N_1 \rightarrow 3, \underline{A \rightarrow Fact_1}$

M_1 is 3-1, factorial(M_1, FM_1), $Fact_1$ is $3 * FM_1$. [is] $M_1 \rightarrow 2$

factorial(2, FM_1), $Fact_1$ is $3 * FM_1$. [2] $N_2 \rightarrow 2, \underline{FM_1 \rightarrow Fact_2}$

M_2 is 2-1, factorial(M_2, FM_2), $Fact_2$ is $2 * FM_2$, $Fact_1$ is $3 * FM_1$.
[is] $M_2 \rightarrow 1$

factorial(1, FM_2), $Fact_2$ is $2 * FM_2$, $Fact_1$ is $3 * FM_1$.
[2] $N_3 \rightarrow 1, \underline{FM_2 \rightarrow Fact_3}$

M_3 is 1-1, factorial(M_3, FM_3), $Fact_3$ is $1 * FM_3$,
 $Fact_2$ is $2 * FM_2$, $Fact_1$ is $3 * FM_1$. [is] $M_3 \rightarrow 0$

factorial(0, FM_3), $Fact_3$ is $1 * FM_3$, $Fact_2$ is $2 * FM_2$,
 $Fact_1$ is $3 * FM_1$. [1] $FM_3 \rightarrow 1$

$Fact_3$ is $1 * 1$, $Fact_2$ is $2 * FM_2$, $Fact_1$ is $3 * FM_1$. [is] $Fact_3 \rightarrow 1$
so now $FM_2 \rightarrow Fact_3 \rightarrow 1$

$Fact_2$ is $2 * 1$, $Fact_1$ is $3 * FM_1$. [is] $Fact_2 \rightarrow 2$
so now $FM_1 \rightarrow Fact_2 \rightarrow 2$

$Fact_1$ is $3 * 2$. [is] $Fact_1 \rightarrow 6$
finally, $A \rightarrow Fact_1 \rightarrow 6$