**The laboratory work 4**

In Prolog, there are a number of built-in functions for computing arithmetic expressions, some of which are listed in Table 1.

|  |  |
| --- | --- |
| X + Y | Sum of X and Y  |
| X – Y | Difference of X and Y  |
| X \* Y | Multiplication of X and Y  |
| X / Y | Division of X and Y  |
| X mod Y | Remainder of the division of X and Y |
| X div Y | Division of X and Y |
| abs(X) | An absolute value of X  |
| sqrt(X) | A square root of X |
| random(X) | A random number from 0 to 1 |
| random(Int,X) | A random number from 0 to Int |
| round(X) | Rounding of Х |
| trunc(X) | An integer part of Х |
| sin(X) | Sinus of X |
| cos(X) | Cosinus of X |
| arctan(X) | Arctangent ofХ |
| tan(X) | Tangent of X |
| ln(X) | A natural logarithm of X |
| log(X) | A logarithm of Х on a foundation of 10 |

Table 1. Mathematical operations in Prolog

**Example 1**

Find a value of the equation of Z=(2\*X+Y)/(X-Y) for input numbers X and Y.

**Solution:**

PREDICATES

expression\_value(real,real).

CLAUSES

expression\_value(X,Y):-X<>Y, Z=(2\*X+Y)/(X-Y),

 write("Z=",Z);

 write("It is not allowed to divied by 0!").

GOAL

write("X="), readreal(X),

write("Y="), readreal(Y), expression\_value(X,Y),nl.

**Comments:** readreal is a predicate for the input of real numbers

**The result of executing the following program:**

The 1st case:

X=4

Y=4

It is not allowed to divide by 0!

The 2nd case:

X=5

Y=2

Z=4

**Example 2.**

Find a minimum of two input values A and B.

**Solution:**

PREDICATES

min(integer,integer,integer).

CLAUSES

min(A,B,A):-A<=B,!.

min(A,B,B).

GOAL

Write("A="),readreal(A),Write("B="),readreal(B),

min(A,B,Min),write("min=",Min),nl.

**The result of executing the following program:**

The 1st case:

A=5

B=17

min=5

The 2nd case:

A=35

B=18

min=18

The 3rd case:

A=8

B=8

min=8

**Example 3.**

Determine whether an odd or even number is selected from 0 to 20

**Solution:**

PREDICATES

chet.

CLAUSES

chet:-random(20,X),write(X),X mod 2=0,

 write("An even number"),!.

chet:-write("An odd number").

GOAL

chet.

**Assignments**

1. Create a program for calculating the value of the expression Y = (X2 + 1) / (X-2) for the variable X.
2. Create a program for calculating the value of the expression S = 2 (X2 + Y2) / (X + Y) for the variables X and Y.
3. Create a program for calculating the value of the expression z = exsinx + 3lnx for the variable X.
4. Create a program for calculating the value of the expression y = ln (lg (sinx + ex)) for the variable X.
5. Create a program for calculating the arithmetic mean of the two numbers entered.
6. Create a program for calculating the geometric mean of the two numbers entered.
7. Make a program to check whether the entered number X is within the specified interval [a, b].
8. Make a program to select the smallest of the three entered numbers.
9. Create a program to select the largest of the three entered numbers.