Example 3 – Arithmetic

Prolog arithmetic expression examples & exercise.

addition	+
multiplication	*
subtraction	-
division	/
power	^
mod	mod

In prolog 'is' has a special functionality in evaluating arithmetic expressions. But with condition that the expression should be on the right side of 'is' otherwise it will give an error.

On Prolog Query Prompt :

```
?- X is 3+2.   // expression on right side of 'is'
   X = 5.

?- 3+2 is X.   // expression on left side of 'is'
   ERROR: is/2: Arguments are not sufficiently instantiated

?- X = 3+2.   // just instantiate variable X to value 3+2
   X = 3+2.

?- 3+2 = X.
   X = 3+2.

?- X is +(3,2).
   X = 5.

?- 5 is 3+2.
   true.

?- 3+2 is 5.
   false.

?- X is 3*2.
   X = 6.

?- X is 3-2.
   X = 1.
```

```
?- X is -(2,3).
   X = -1.

?- X is 5-3-1.
   X = 1.

?- X is -(5,3,1).
   ERROR: is/2: Arithmetic: `(-)/3' is not a function

?- X is -(-(5,3),1).
   X = 1.

?- X is 5-3-1.
   X = 1

?- X is 3/5.
   X = 0.6.

?- X is 3 mod 5.
   X = 3.

?- X is 5 mod 3.
   X = 2.
?- X is 5^3.
   X = 125.

?- X is (5^3)^2.
   X = 15625.

?- X = (5^3)^2.
   X = (5^3)^2.

?- 25 is 5^2.
   true.

?- Y is 3+2*4-1.
   Y = 10.

?- Y is (3+2)*(4)-(1).
   Y = 19.

?- Y is -(*(+(3,2),4),1).
   Y = 19.

?- X is 3*2, Y is X*2.
   X = 6,
   Y = 12.
```

Exercise :- How does Prolog answer to below Queries

```
(1)  ?- 3<5.
(2)  ?- 4<2.
(3)  ?- 6>5.
(4)  ?- 12<=12.
(5)  ?- 12 =<12.
(6)  ?- 3+4 =< 7.
(7)  ?- 5=\=5.      // 5 is not equal to 5.
(8)  ?- 5=\=4.
(9)  ?- 5=\=(3+2).
(10) ?- 8=8.
(11) ?- 8=:=8.     // 8 equal to 8.
(12) ?- 8=:=9.
(13) ?- (2+1)*10 = 30.
(14) ?- (2+1)*10 =:= 30.
(15) ?- X=2, X<3.
(16) ?- X=4, X<3.
(17) ?- *(2,3) = 2*3.
(18) ?- X = Z.
(19) ?-(X>3)=(4>3).
(20) ?- X = 3, C is X*X*X.
(21) ?- X = 3, X*X*X is C.
(22) ?- is(Y,^(2,2)). // don't type space between 'is'
                        and bracket
```