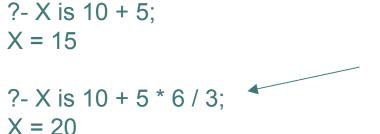# Prolog – Arithmetic

- Prolog is a programming language, therefore, arithmetic is implemented as expected.
- The only difference to other programming languages is that assignment is done via the predicate <u>is</u> rather than the equal sign, since the equal sign has been used for the unification operator.

Examples:

?- X is 10 + 5;
X = 15

?- X is 10 + 5 * 6 / 3;
X = 20

Precedence and associativity of operators are respected.

Prolog – Arithmetic

Example: write a predicate definition for length/2 that takes a list in its first argument and returns the length of the list in its second argument.

```
length([ ], 0).
length(L, N) :- L = [H|T], length(T,NT), N is NT + 1.
```

Prolog – Arithmetic

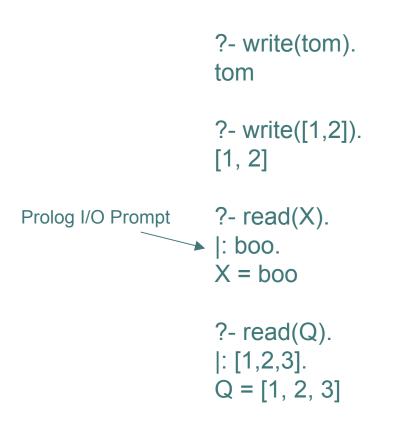Example: we can also use arithmetic in compound statements.

```
?- X is 5, Y is 2 * X.
X = 5
Y = 10
```

Prolog – I/O

- write(term)
  - is true if term is a Prolog term, writes term to the terminal.
- read(X)
  - is true if the user types a term followed by a period, X becomes unified to the term.
- nl
  - is always true and writes a newline character on the terminal.

☞ Extra-logical predicates due to the side-effect of writing/reading to/from the terminal.

Prolog – I/O

```
?- write(tom).
tom

?- write([1,2]).
[1, 2]

?- read(X).
|: boo.
X = boo

?- read(Q).
|: [1,2,3].
Q = [1, 2, 3]
```

Prolog I/O Prompt

Prolog – I/O

Example: write a predicate definition for fadd/1 that takes a list of integers, adds 1 to each integer in the list, and prints each integer onto the terminal screen.

```
fadd([ ]).
fadd([ H | T ]) :- I is H + 1, write(I), nl, fadd(T).
```

Exercises

(1) Define a predicate max/3 that takes two numbers as its first two arguments and unifies the last argument with the maximum of the two.

(2) Define a predicate maxlist/2 takes a list of numbers as its first argument and unifies the second argument with the maximum number in the list. The predicate should fail if the list is empty.

(3) Define a predicate ordered/1 that takes a list of numbers as its argument and succeeds if and only if the list is in non-decreasing order.

(4) Define the predicate member/2 that takes list as its first argument and a term as its second argument. The predicate is to return true if the term is in the list otherwise it is to return false.