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 is 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

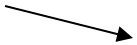
```
?- write(tom).
tom

?- 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).
```

Member Predicate

Write a predicate member/2 that takes a list as its first argument and an element as its second element. This predicate is to return true if the element appears in the list.

```
member([E|_],E).
member([_|T],E) :- member(T,E).
```

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.