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 = 20

Precedence and associativity of operators are respected.

Prolog – Arithmetic

<u>Example</u>: 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.

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).
Prolog I/O Prompt
                  → |: boo.
                   X = boo
                   ?- read(Q).
                   |: [1,2,3].
                   Q = [1, 2, 3]
```

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), nI, 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.