# Lecture 1

* **Arithmetic expressions.**

$$2+15 \qquad 5*7 \qquad 10-3 \qquad 7/2$$

* **Precedence/associativity.**

$$2+(3+7) = (2+3)+7 \quad \Big\}(+) \text{ is associative.}$$

$$2*5+3 = (2*5)+3$$

$$2+5*3 = 2+(5*3) \quad \Big\}* \text{ has higher precedence than } +$$

* **Boolean expressions.**

$$\text{True} \qquad\qquad \text{False}$$

$$\text{not True}$$

$$\text{True \&\& False} = \text{False}$$

* **Equality and Order**

$$5 == 5 \qquad 'a' == 'b'$$

$$\underbrace{3 == 4}_{\text{Bool}}$$

$$\underline{3 == 4} == 5 \qquad a == b == c$$
$$\text{False} == 5$$

$$\underline{3 == 3} == 3 \qquad a == b \;\&\& \; b == c$$
$$\text{True} \qquad\qquad\qquad (\&\& \; a == c)$$

$5 \quad :: \quad \text{Int}$ $\qquad 5 \in \text{Int}$

value $\qquad$ type

:t 5

True :: Bool.

$f : \mathbb{N} \to \mathbb{N}$
$f(x) = x^2$

succ :: Int $\to$ Int
succ x = 1 + x

succ 3 = 4

fac 0 = 1
fac 1 = 1
fac 2 = 2
fac 3 = 6
fac :: Int $\to$ Int
fac 0 = 1
fac n = fac (n-1) * n

x :: Int
x = x + 1
$\quad = (x + 1) + 1$
$\quad = ((x + 1) + 1) + 1$
$\qquad \vdots$
$\qquad \downarrow$
$\qquad \bot$