

Lambda Calculus

Alpha-Conversion

$\lambda x. M = \lambda y. [x := y]M$ if $(y \text{ nfin } \lambda x. M)$

Example

$(\lambda x. x) = (\lambda y. y)$

`a = (\x -> x)`

`a = (\y -> y) -- α-Reduction`

Beta-Reduction

$(\lambda x. M)N = [x := N]M$

Example

$(\lambda x. x)a = a$

$(\lambda x. xy)a = ay$

`a = (\x -> x) 5`

`a = 5 -- β-Reduction`

Eta-Reduction

$(\lambda x. fx) = f$

`add5 xs = map (\x -> x + 5) xs`

`add5' = map(\x -> x + 5) -- η-Reduction`