Let's Write a Lambda Calculus in Haskell

@mjgpy3

/mjgpy3/presentations

WHO AM I?

Michael Gilliland @mjgpy3

Matrix Solutions 

λ 2-3 years

What is the Lambda Calculus?

1930s

1930s

Alonzo Church

1930s

Alonzo Church

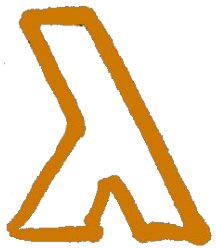
function-centric

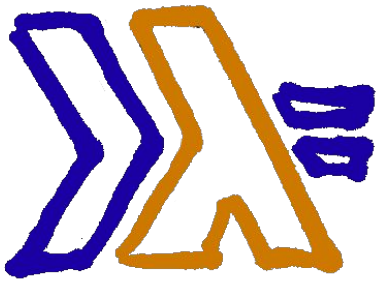
1930s

Alonzo Church

function-centric

"Simple"





Variables

Functions

Applications

Variables $a, b, c, \ldots, z$

Functions

Applications

Variables a, b, c, ..., z

Functions λvariable.term

Applications

Variables

a, b, c, ..., z

Functions

argument

λvariable . term

Applications

Variables

a, b, c, ..., z

Functions

λvariable . term

argument

body

Applications

Variables	a, b, c, ..., z
Functions	λvariable . term
Applications	(term term)

Variables	a, b, c, ..., z
Functions	λvariable . term
Applications	operator (term term)

Variables

a, b, c, ..., z

Functions

λvariable . term

Applications

(term term)

operator

operand

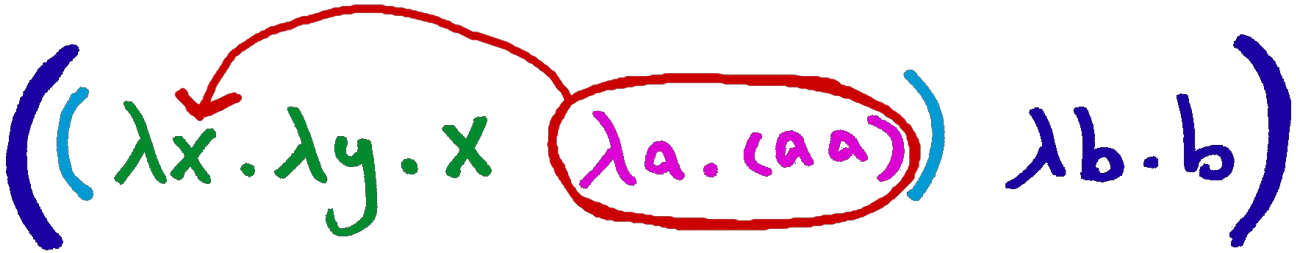
Variables	a, b, c, ..., z
Functions	λvariable . term
Applications	(term term)

Examples

$$\lambda x.x$$

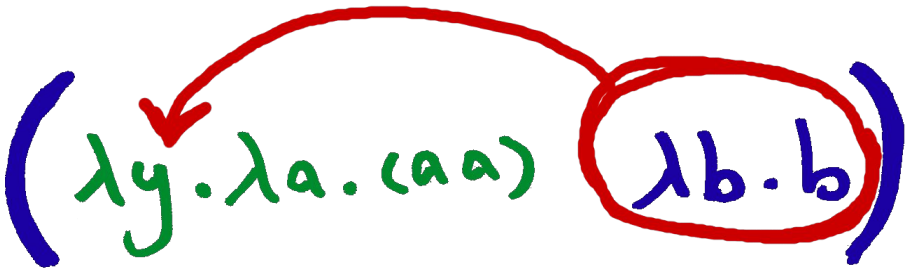
$$((\lambda x.\lambda y.x \;\; \lambda a.(aa)) \;\; \lambda b.b)$$


((λx.λy.x λa.(aa)) λb.b)


((λx.λy.x λa.(aa)) λb.b)

$$((\lambda x.\lambda y.x \ \ \lambda a.(a\,a))\ \lambda b.b)$$

$$(\lambda y.\lambda a.(a\,a)\quad \lambda b.b)$$


(λy.λa.(a a) λb.b)

$\lambda a.(a\,a)$

Code Time