CSE216
Programming Abstraction

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Agenda

- Practice on lambda calculus syntax and semantics

Lambda calculus syntax summary

- TERM::= Var //Variables

  | lambda Var. TERM // Definition/Abstraction

  | TERM TERM // Application

Var ::= x | y | z …

Lambda calculus semantics summary

- (λ x.M)N -> M with bound occurrences of x substituted by N

- Sometimes written M [x->N]

- Something to say later, called “capture-avoiding”

Draw parse trees

- λ x. x λ y

Draw parse trees

- λ x. λ y. x y λ z. z y

Draw parse trees

- λ x. λ y. x y z

beta-reduction

- $(\lambda x.xx)(\lambda y.yx)z$

beta-reduction

- $(\lambda x.xx)(\lambda y.yx)z$

beta-reduction

- Someone thinks the lambda expression ((λ x. λ y. y) y) (λ x. x a) reduces to a. Can you spot the issue?