Functions, Variables and Substitution

CS 350

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Overview: Functions

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  - To start: single argument, inputs and outputs number

Syntax: Definitions

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```
(define-type FunDef
  (mkFunDef [name : Symbol]
            [arg : Symbol]
            [body : Expr]))
```

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```
(define (parse-fundef [s : S-Exp]) : FunDef
  (cond
    [(s-exp-match? `{define {SYMBOL SYMBOL} ANY} s)
     (mkFunDef
        (s-exp->symbol
           (first (s-exp->list (second (s-exp->list s)))))
         (s-exp->symbol
            (second (s-exp->list (second (s-exp->list s)))))
         (elab (parse (third (s-exp->list s)))))]
    [else (error 'parse-fundef "invalid input")]))
```

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(define-type Expr
  (NumLit [n : Number])
  (Plus [left : Expr]
        [right : Expr])
  (Times [left : Expr]
         [right : Expr])
  (If0 [test : Expr]
       [thenBranch : Expr]
       [elseBranch : Expr])
  (Var [x : Symbol])
  (FunCall [f : Symbol]
           [arg : Expr]))
```

- Also add variables and calls to surface syntax

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  - Might do later in the course

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```
(define (interp [expr : Expr]
                [defs : (Listof FunDef)]) : Number
  ....)
```

How can we replace a variable

Substitution

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- More recursion!
- Traverse the expression