61A Lecture 26

Monday, November 3

Announcements

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- Midterm survey due Monday 11/10 @ 11:59pm (Thanks!)

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- **Specification:** A document describe the precise syntax and semantics of the language.
- **Canonical Implementation:** An interpreter or compiler for the language.

Calculator

(Demo)

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Scheme expressions are represented as Scheme lists! Source code is data

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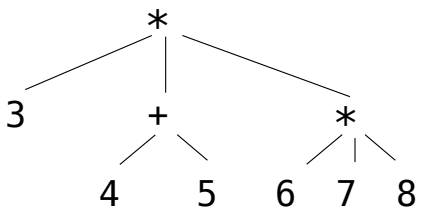

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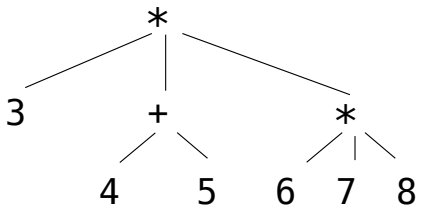
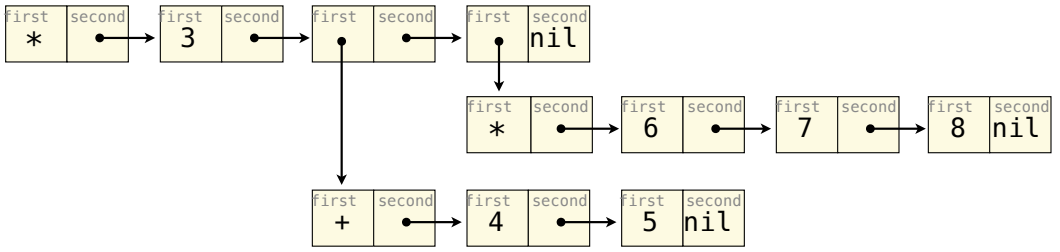


Representation as Pairs



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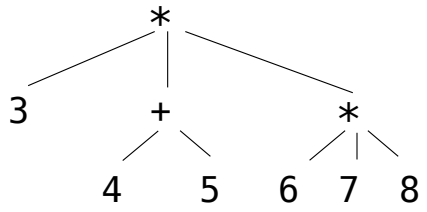

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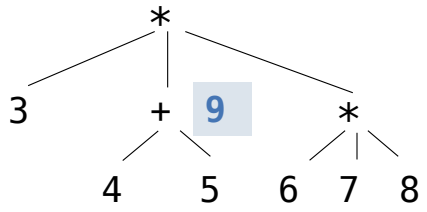

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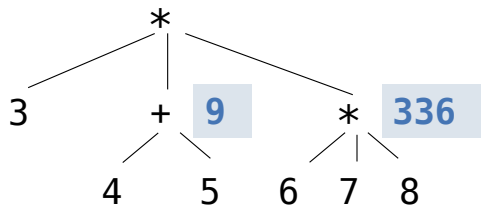

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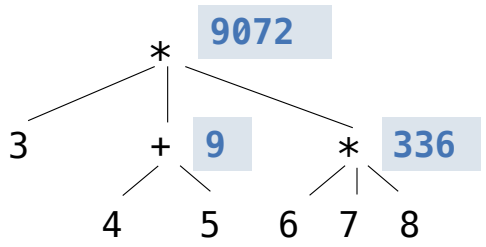

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def calc_eval(exp):
    if type(exp) in (int, float):
        return exp
    elif isinstance(exp, Pair):
        arguments = exp.second.map(calc_eval)
        return calc_apply(exp.first, arguments)
    else:
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It is a generic function that dispatches on the type of the expression (primitive or call).

Implementation

```
def calc_eval(exp):
    if type(exp) in (int, float):
        return exp
    elif isinstance(exp, Pair):
        arguments = exp.second.map(calc_eval)
        return calc_apply(exp.first, arguments)
    else:
        raise TypeError
```

Language Semantics

A number evaluates...

to itself

A call expression evaluates...

to its argument values

combined by an operator

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Recursive call returns a number for each operand

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Applying Built-in Operators

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Language Semantics

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(Demo)

Interactive Interpreters

Read-Eval-Print Loop

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