61A Lecture 27

Wednesday, November 5

Announcements

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- Project 4 due Thursday 4/23 @ 11:59pm (Big!)

Interpreting Scheme

The Structure of an Interpreter

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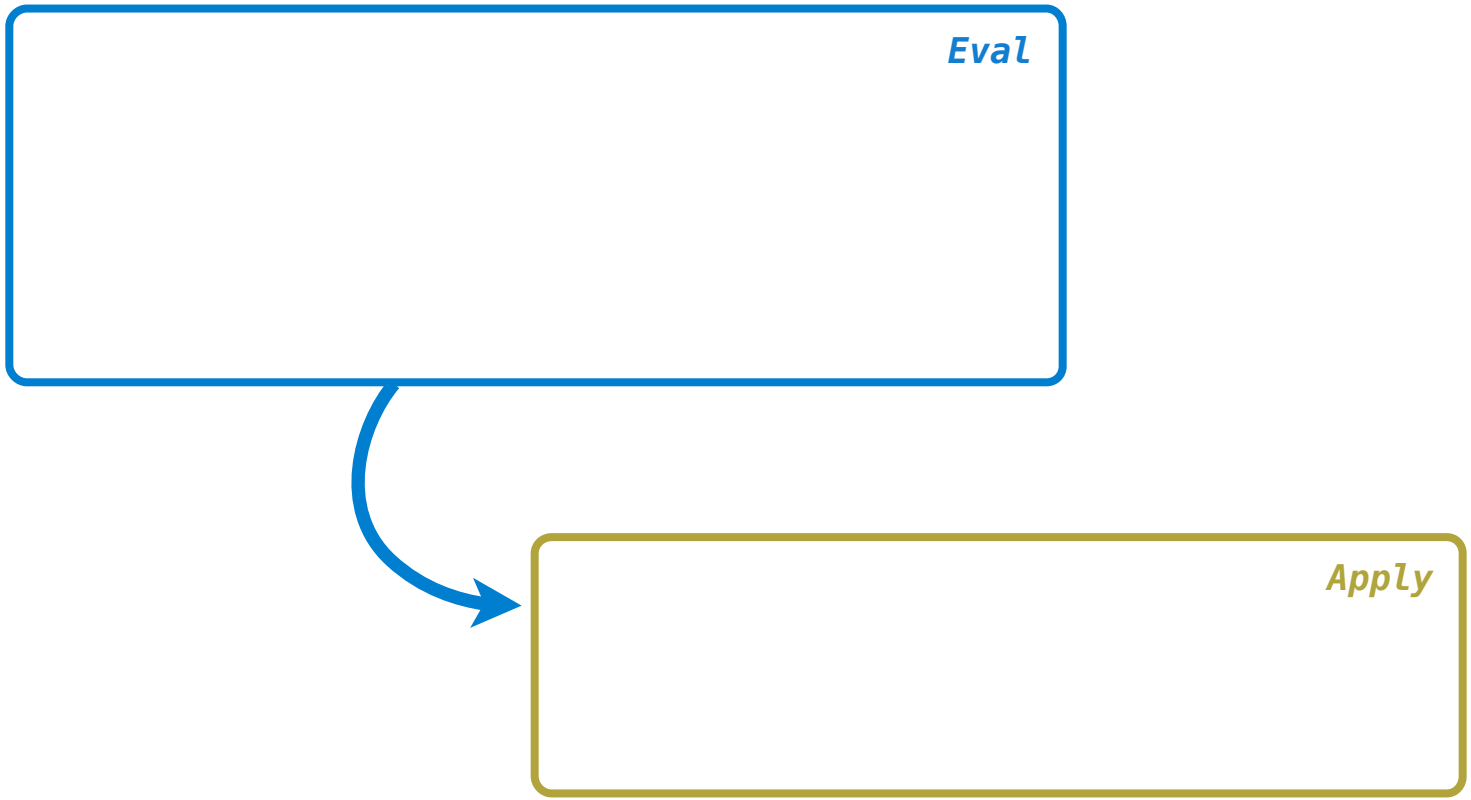

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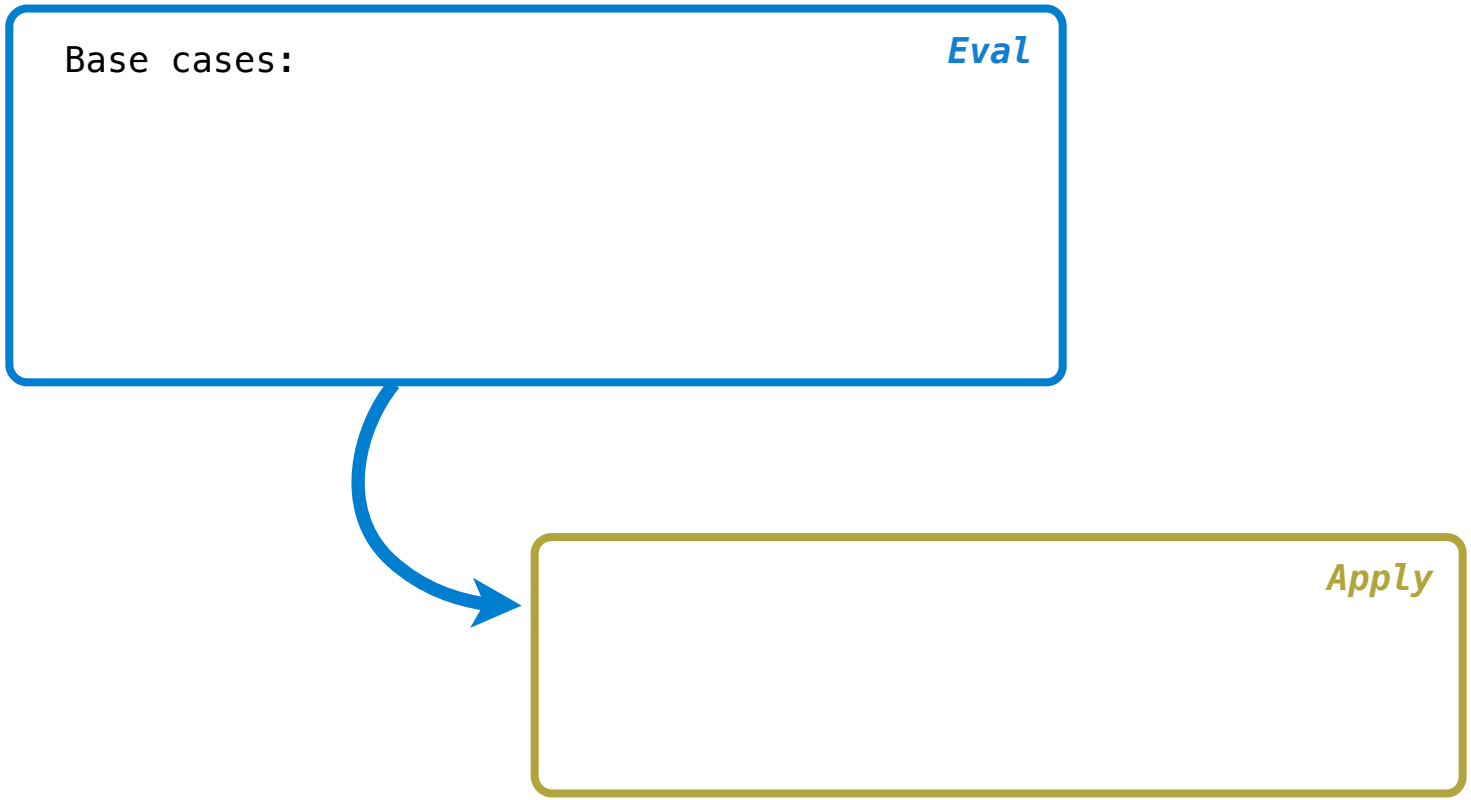

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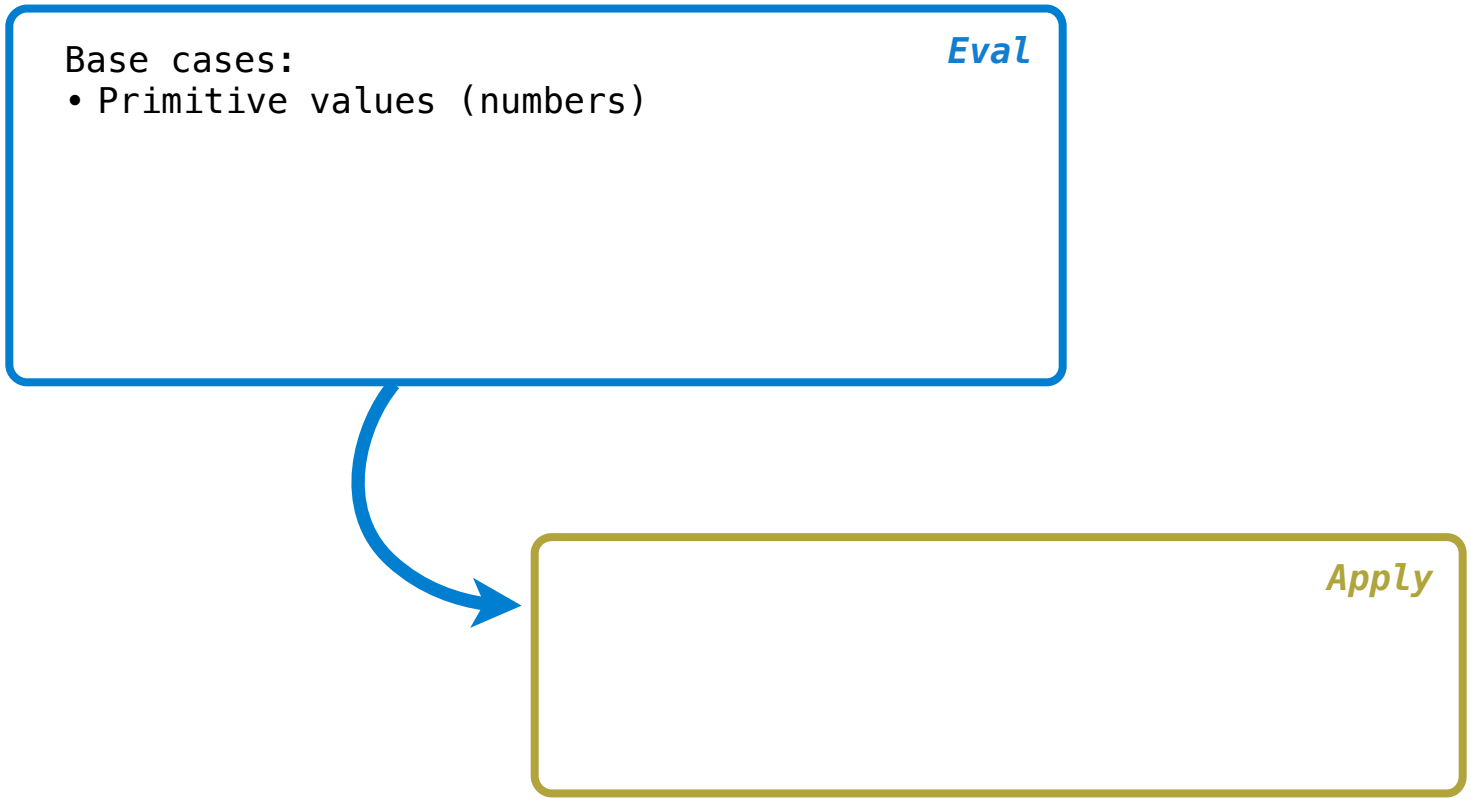

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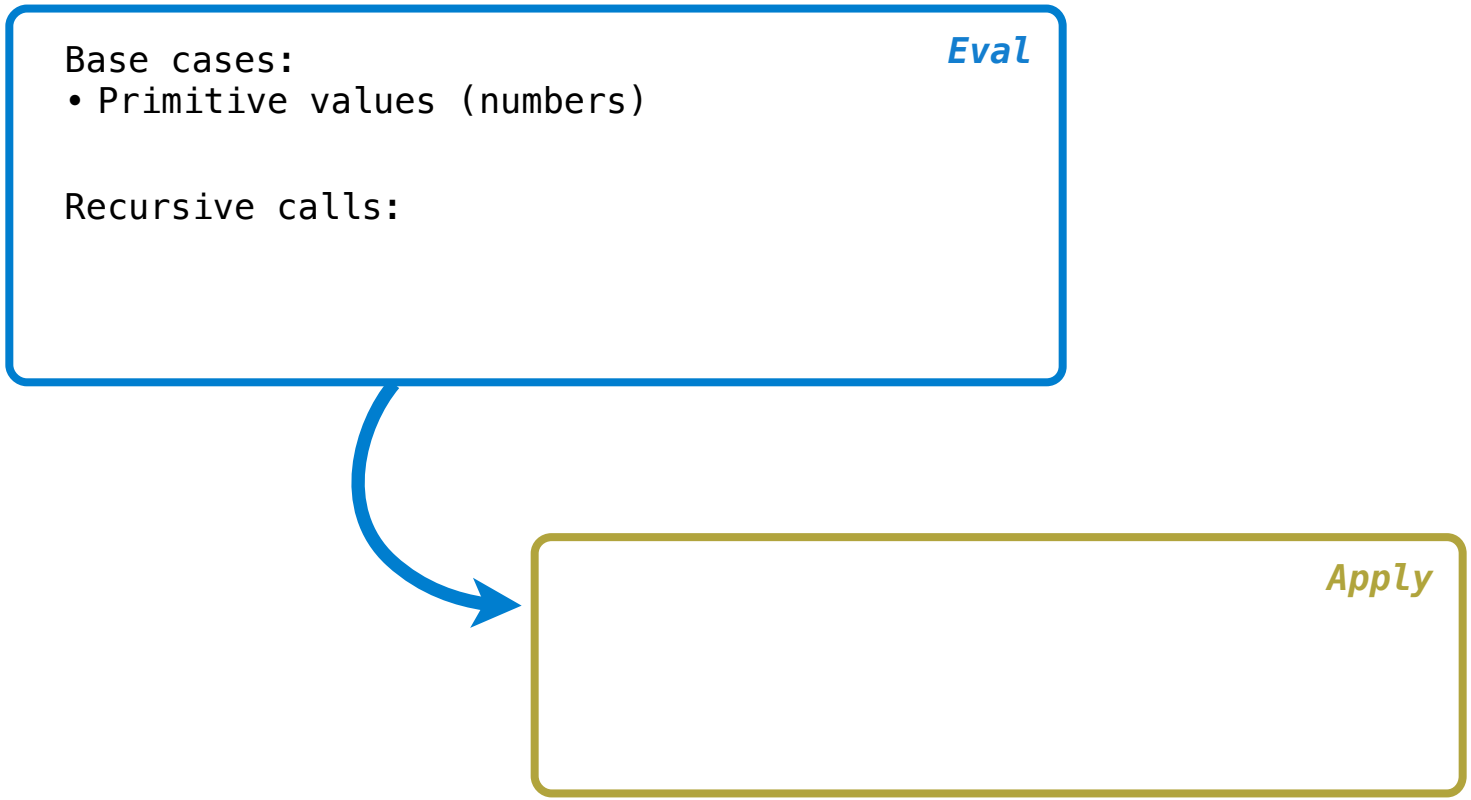

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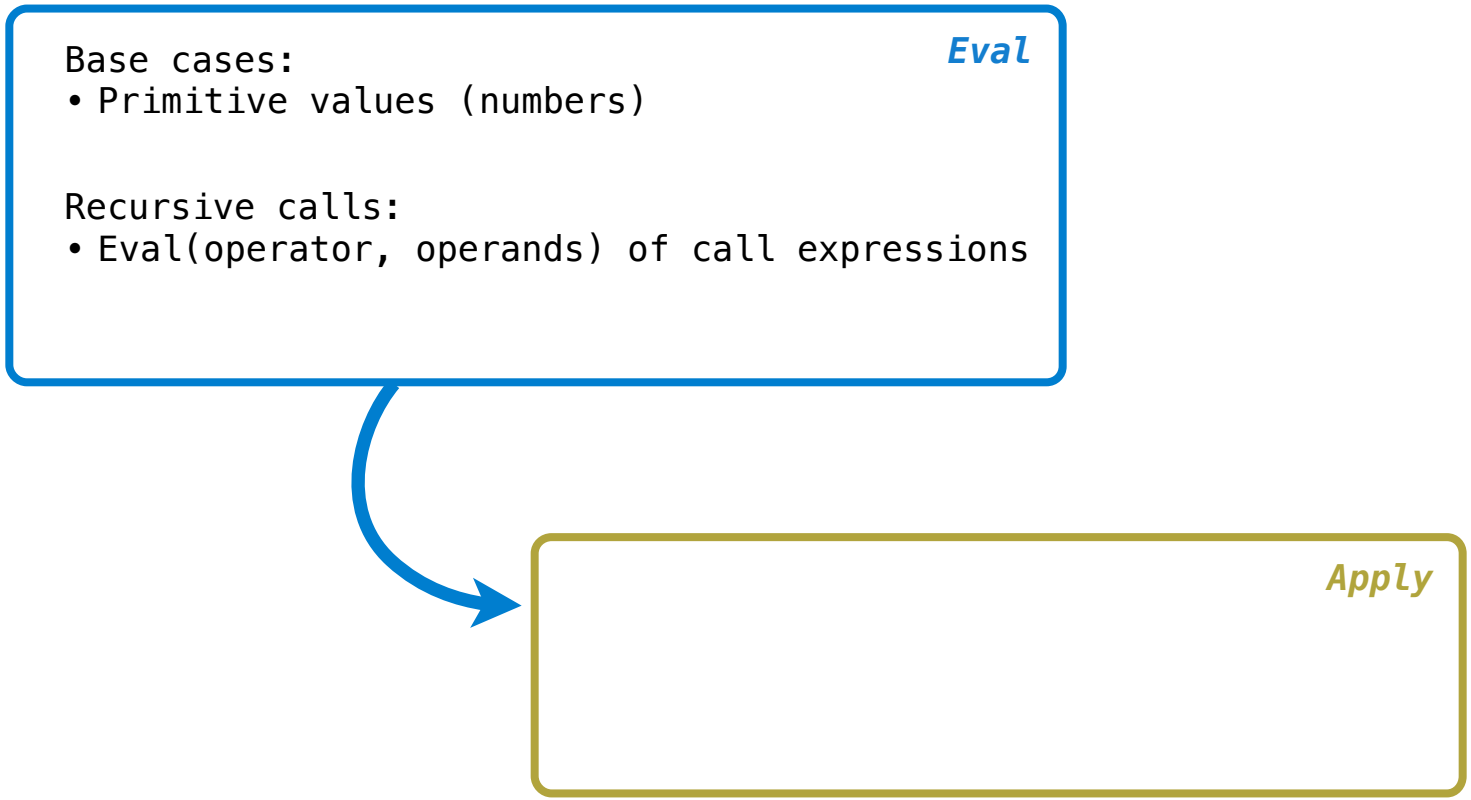

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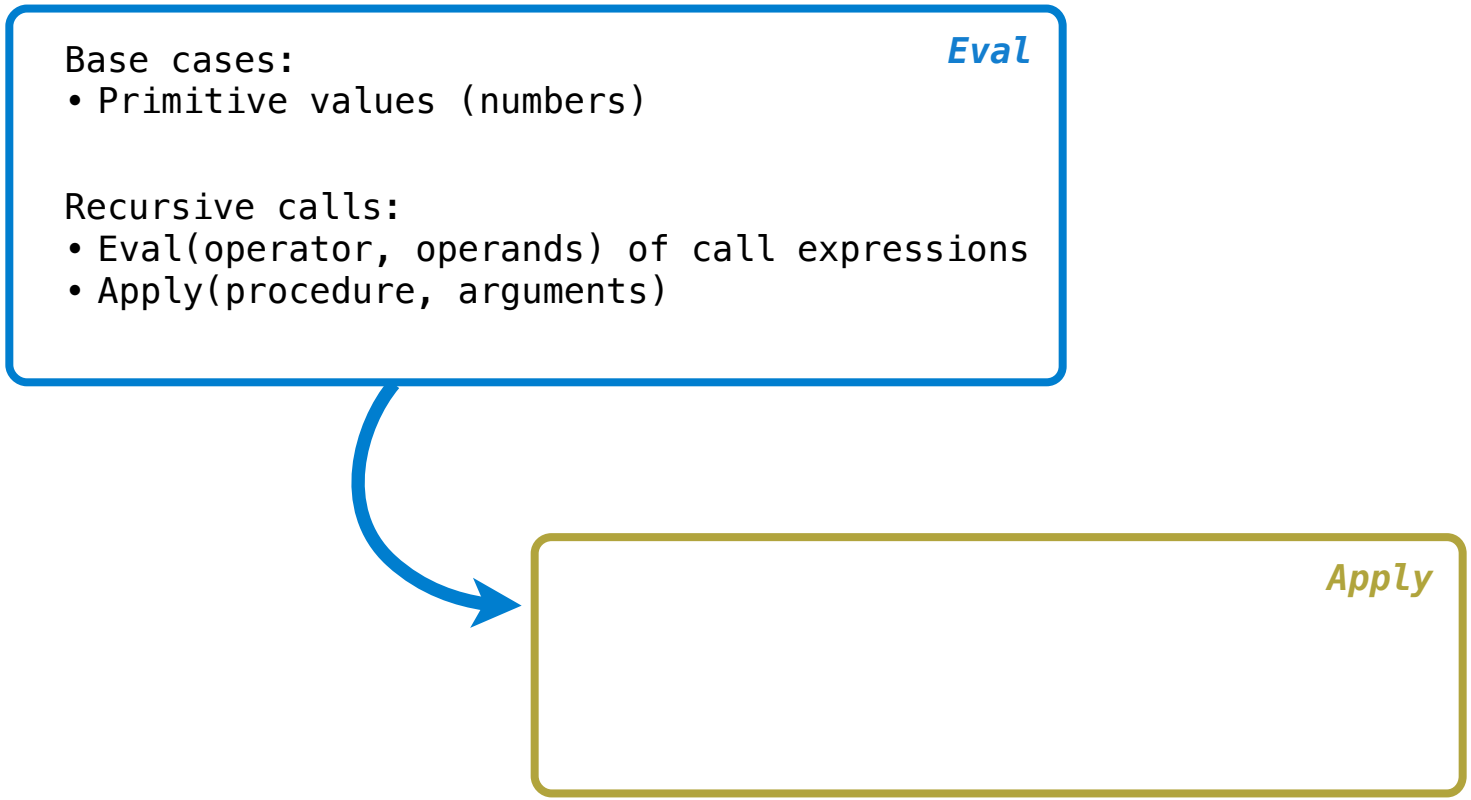

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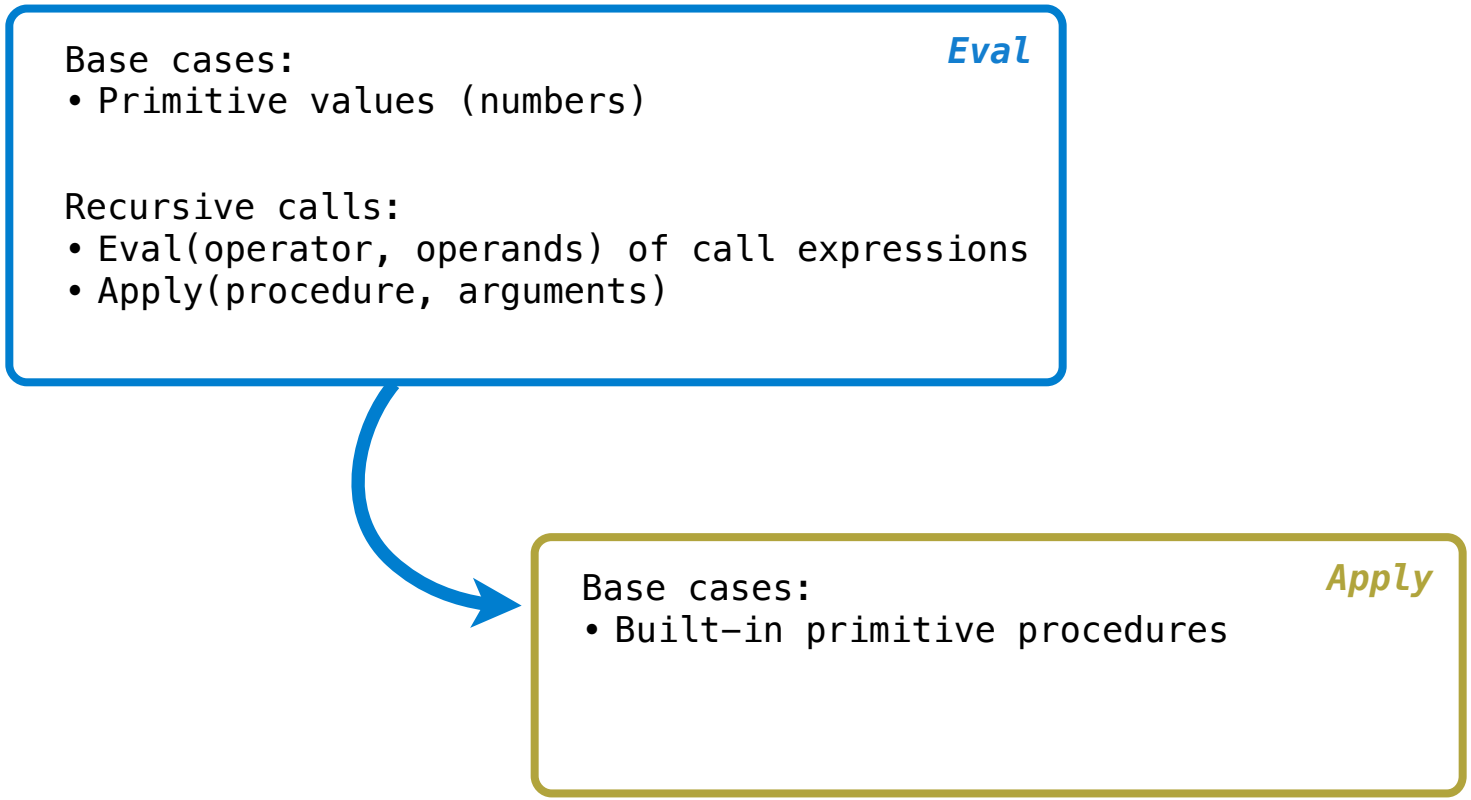

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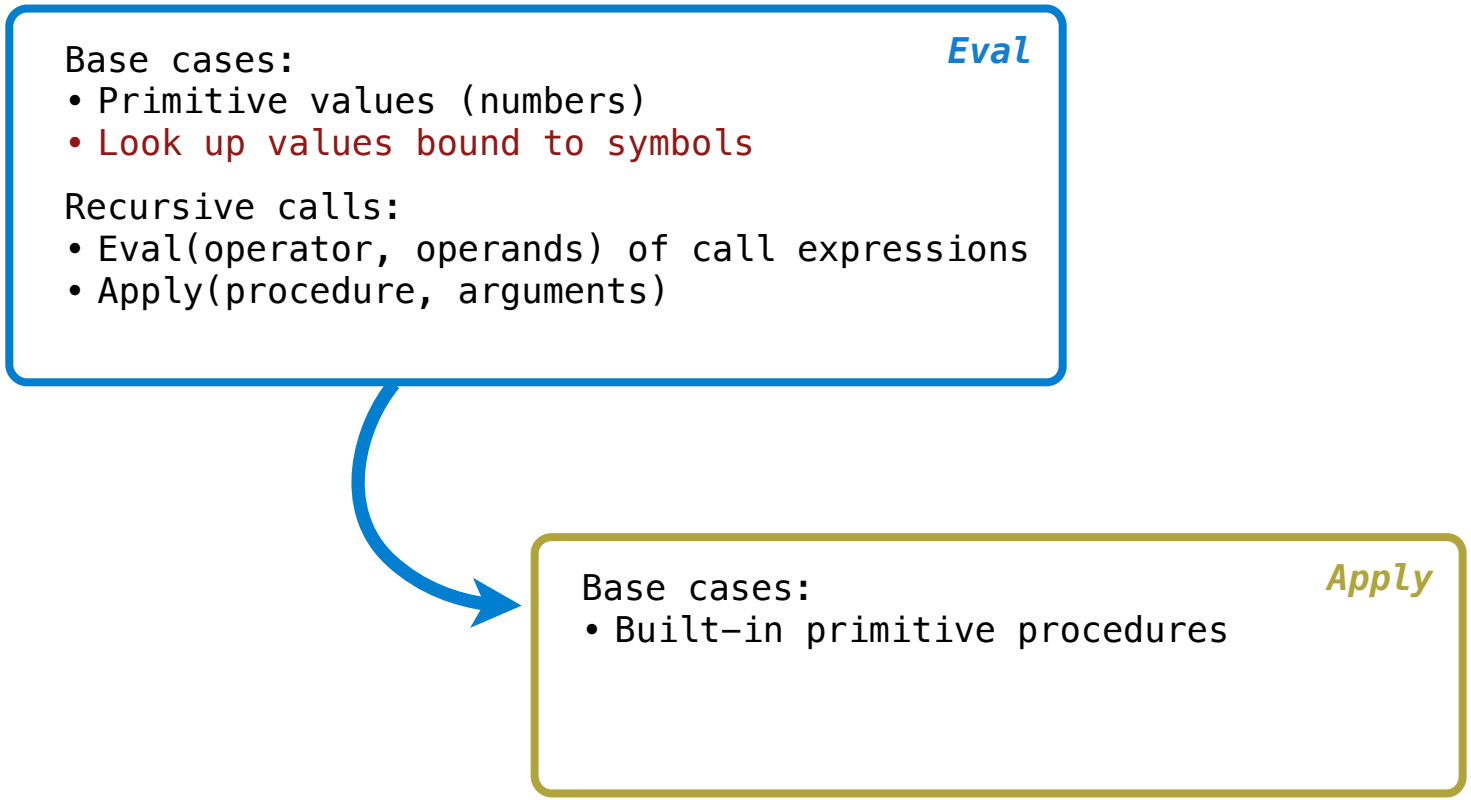

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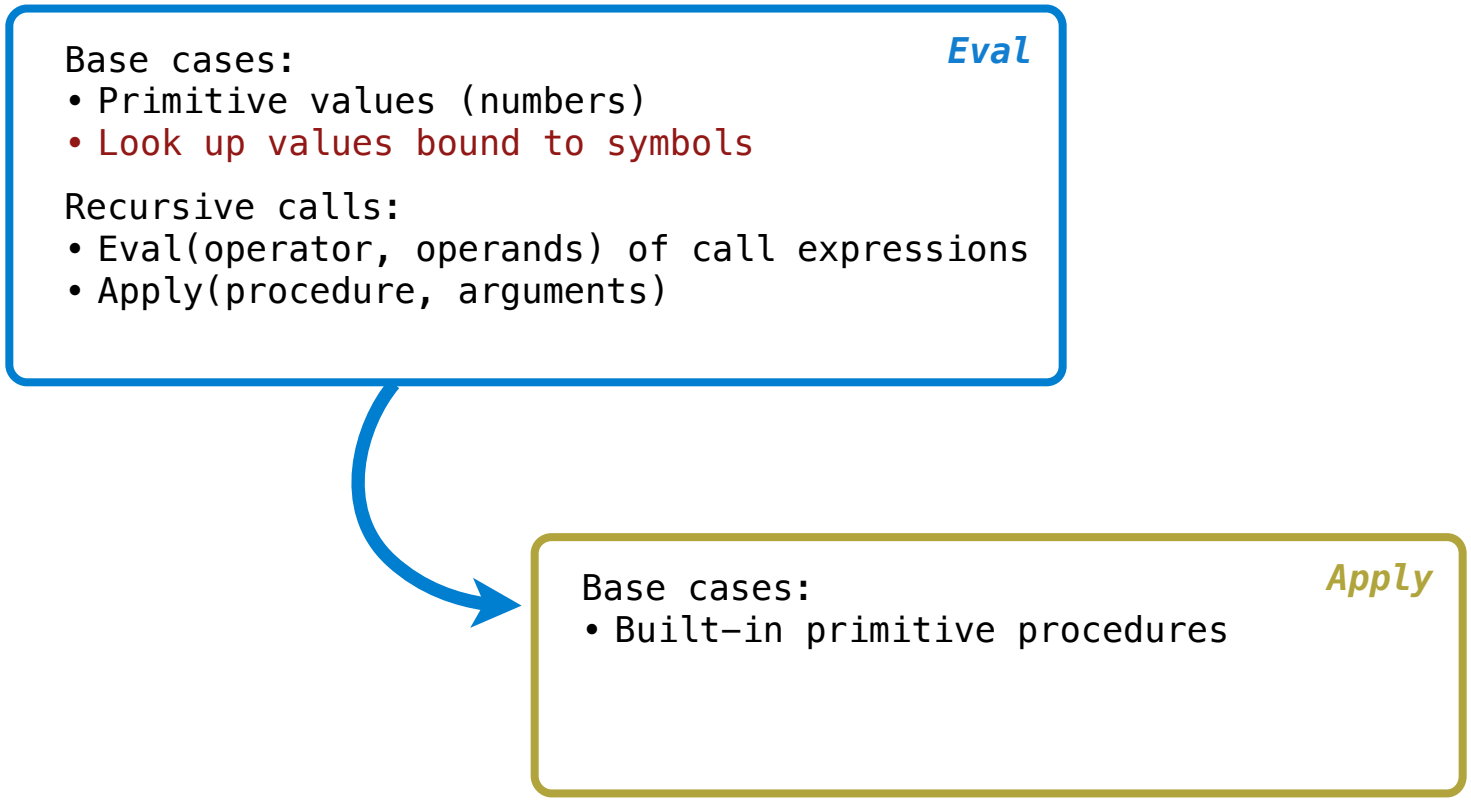

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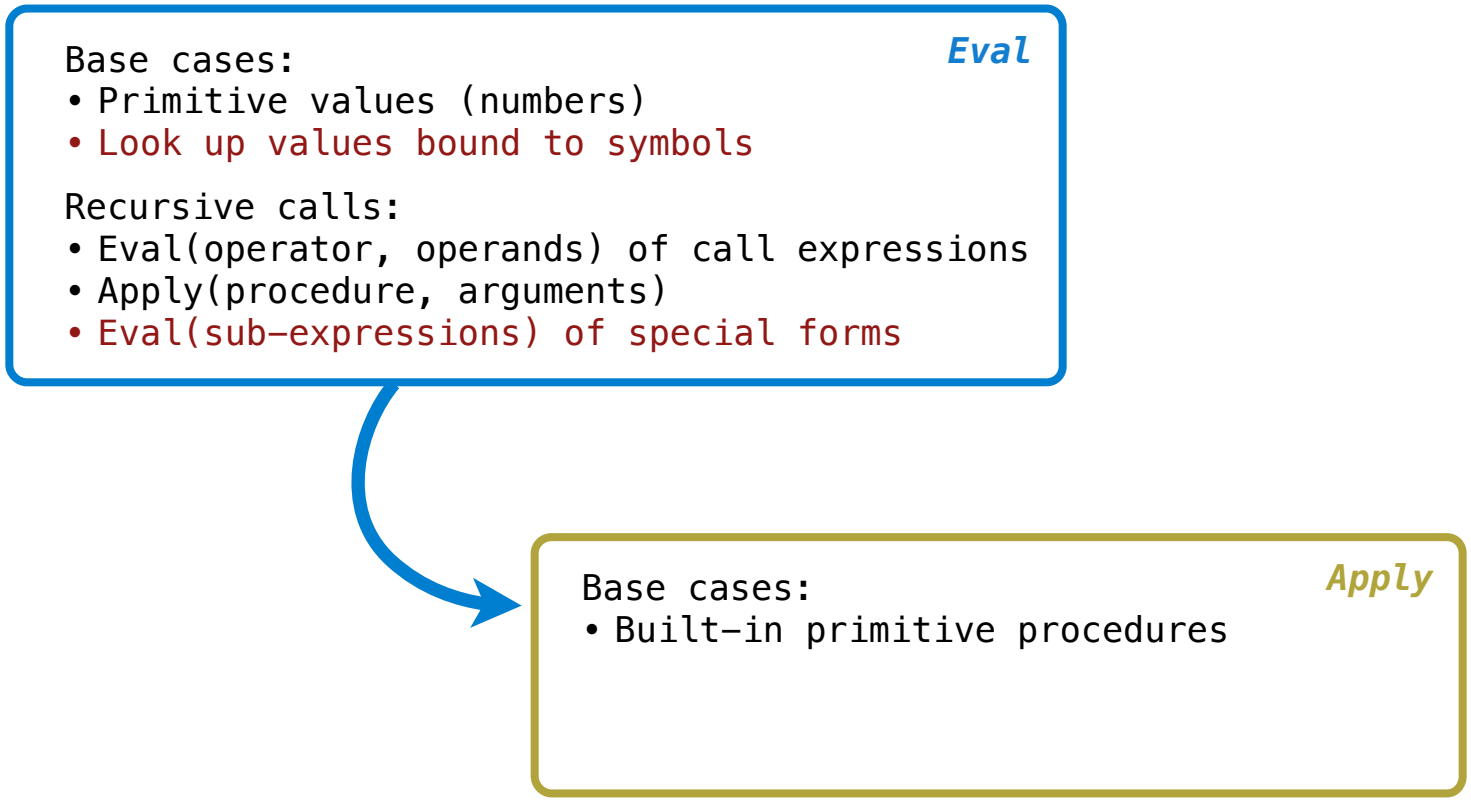

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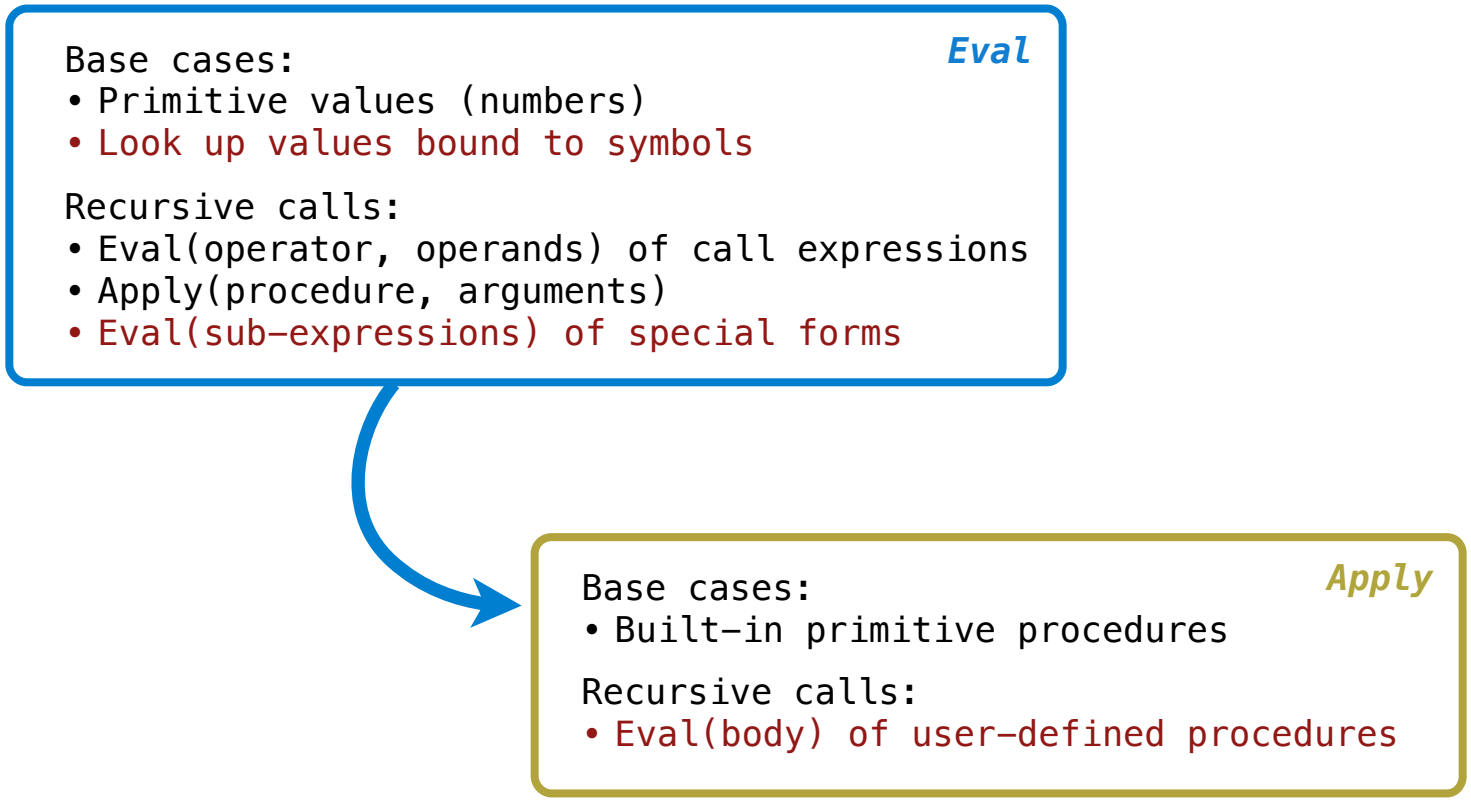

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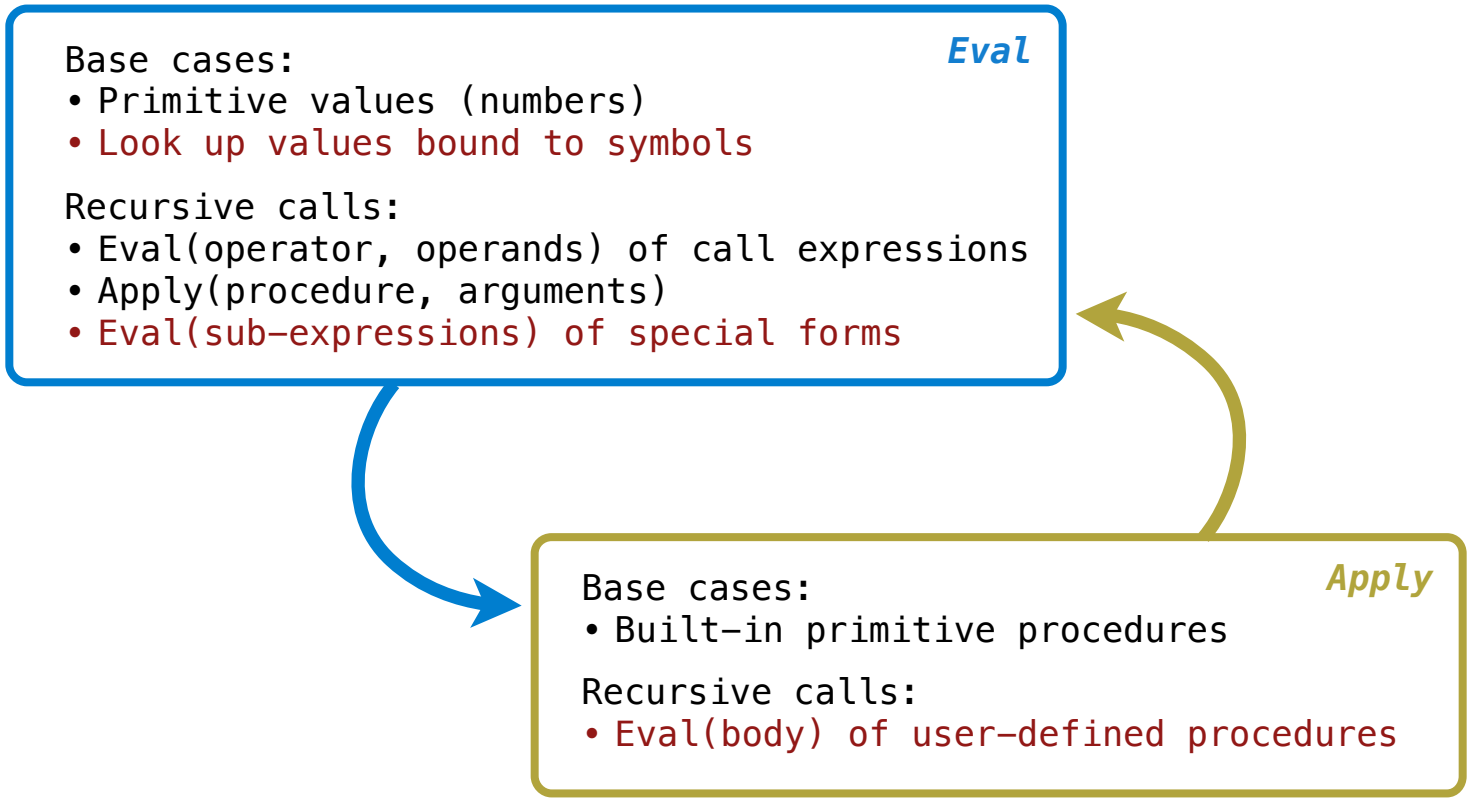

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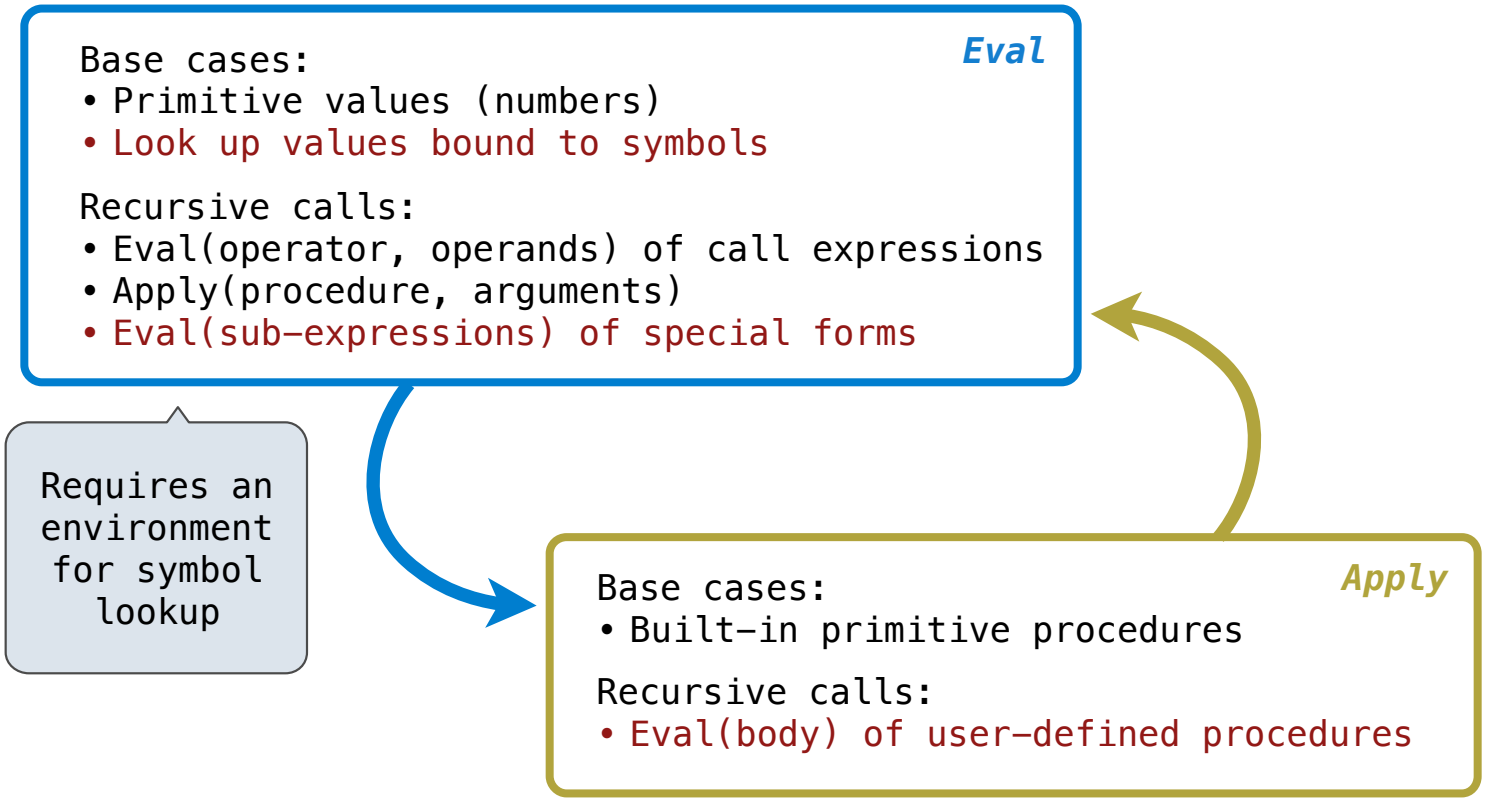

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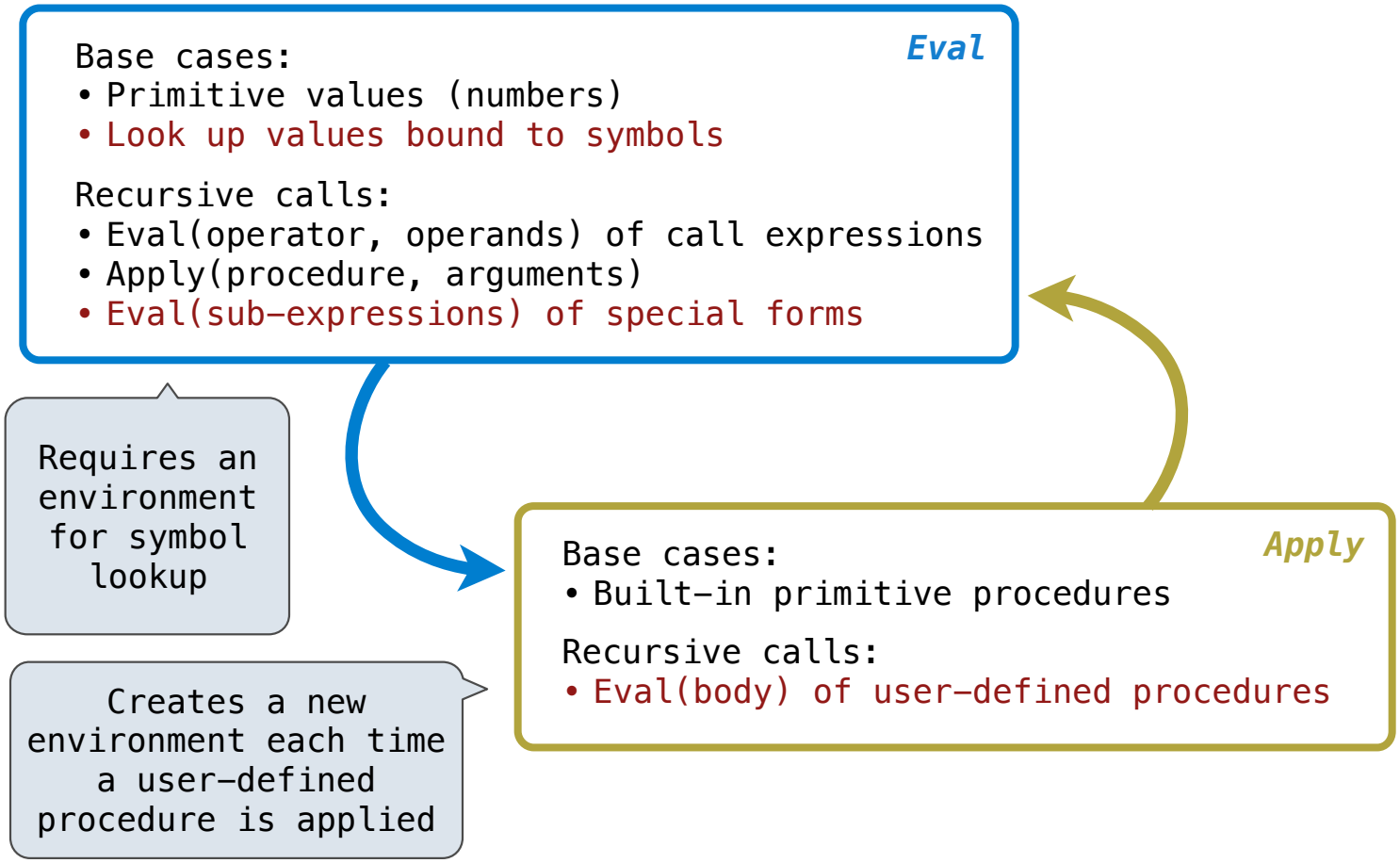

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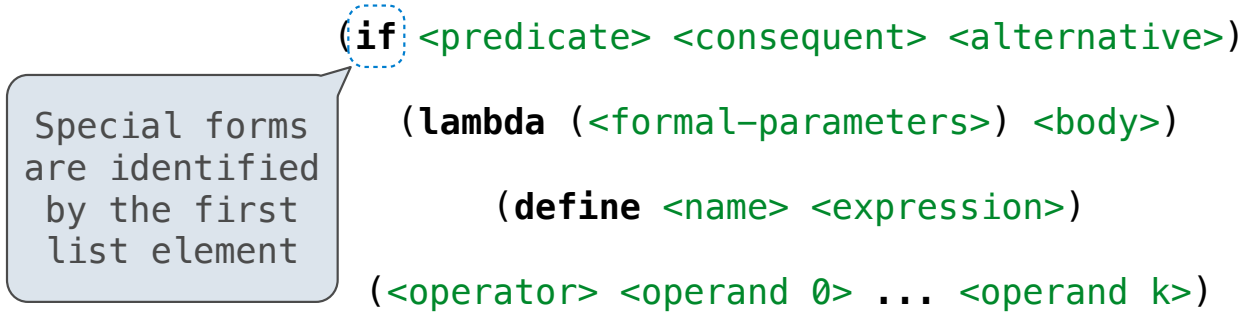

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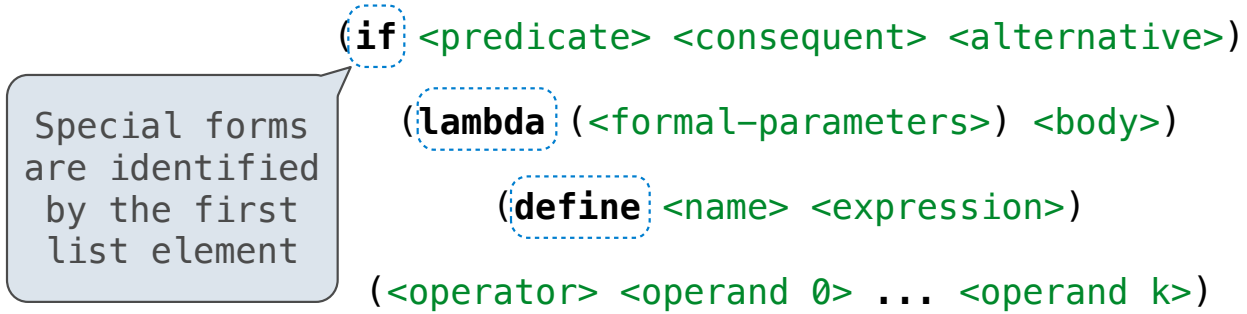

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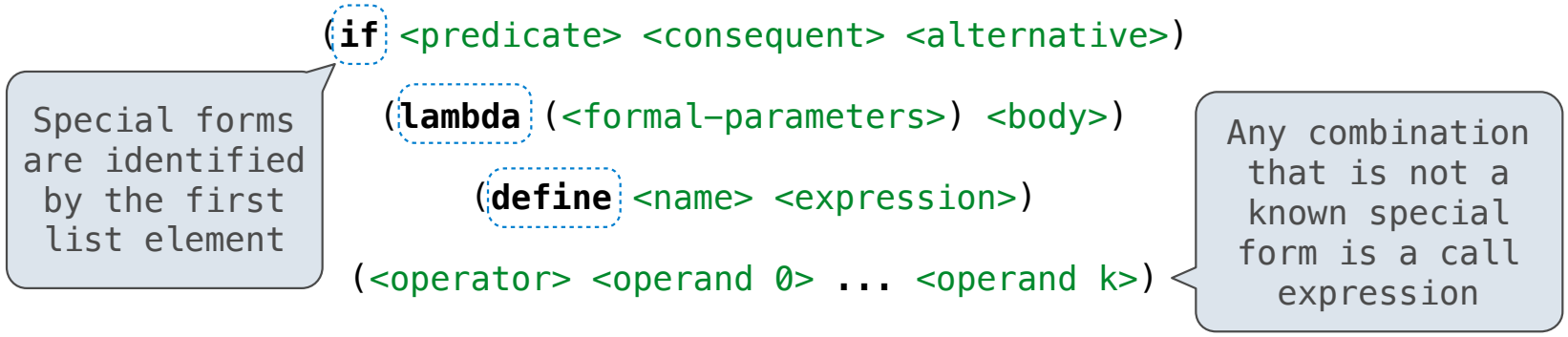

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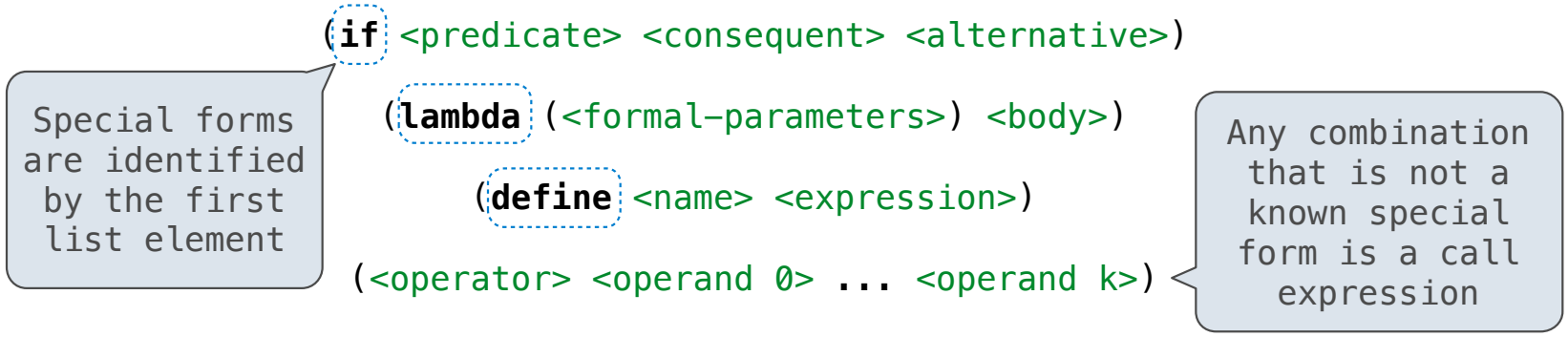


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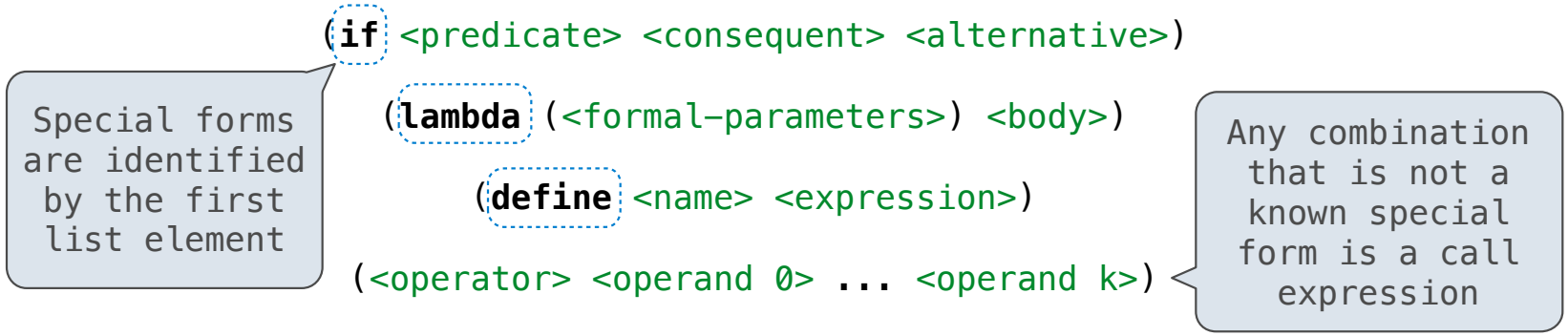


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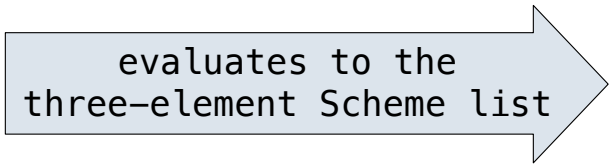
`(quote <expression>)` `(quote (+ 1 2))`  `(+ 1 2)`

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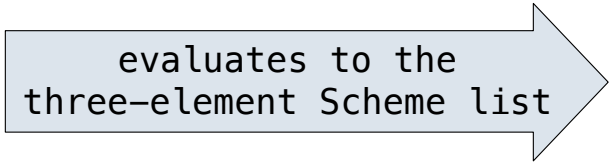
`(quote <expression>)` `(quote (+ 1 2))`  `(+ 1 2)`

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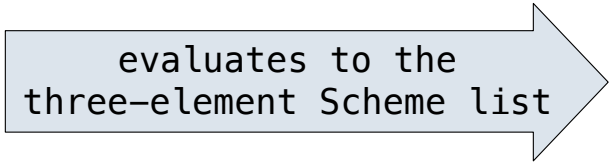
`(quote <expression>)` `(quote (+ 1 2))`  `(+ 1 2)`

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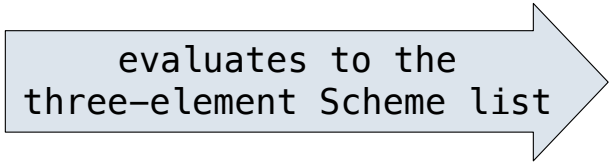


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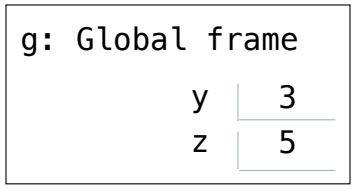

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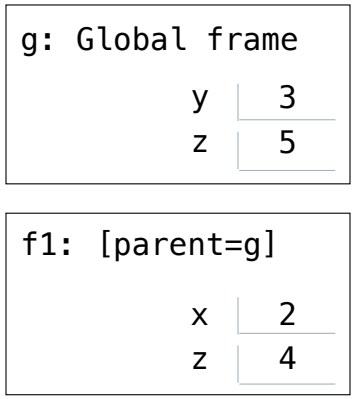

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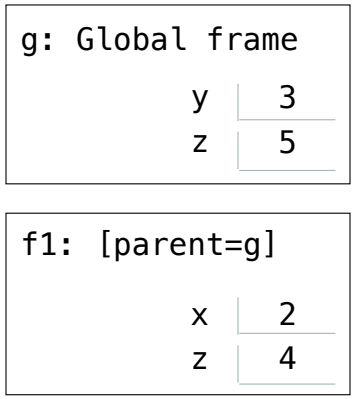

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```

1. Evaluate the <expression>
2. Bind <name> to its value in the current frame

```
(define x (+ 1 2))
```

Procedure definition is shorthand of define with a lambda expression

```
(define (<name> <formal parameters>) <body>)
(define <name> (lambda (<formal parameters>) <body>))
```

Applying User-Defined Procedures

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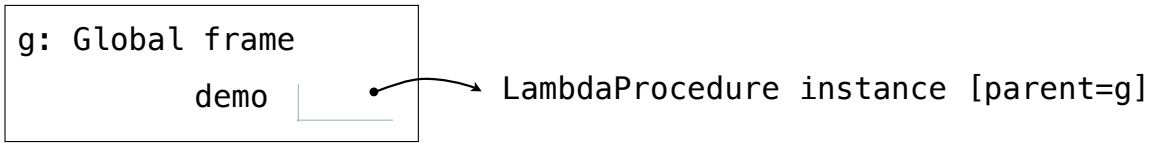

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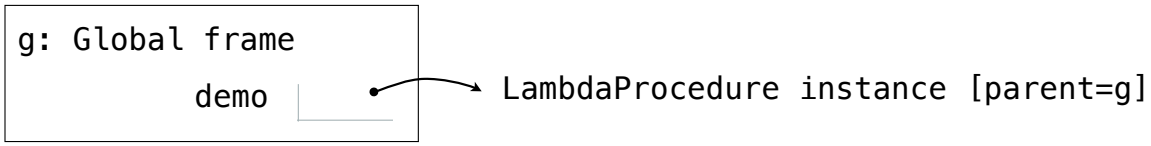

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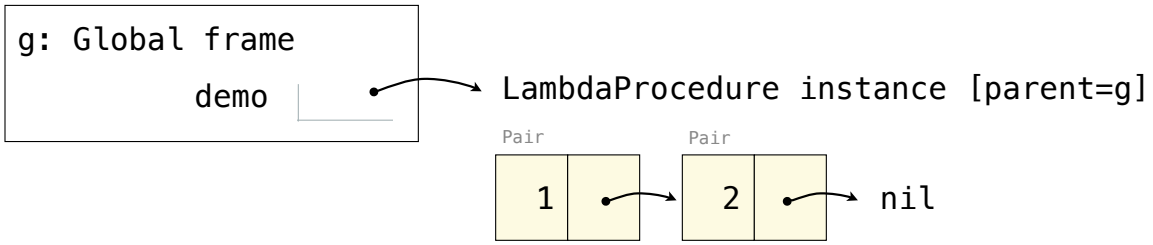

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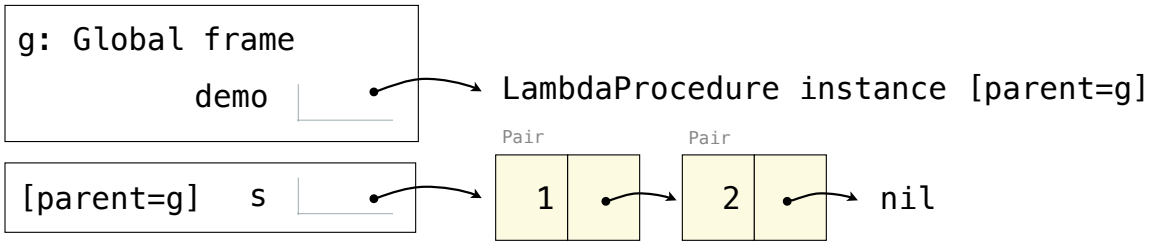

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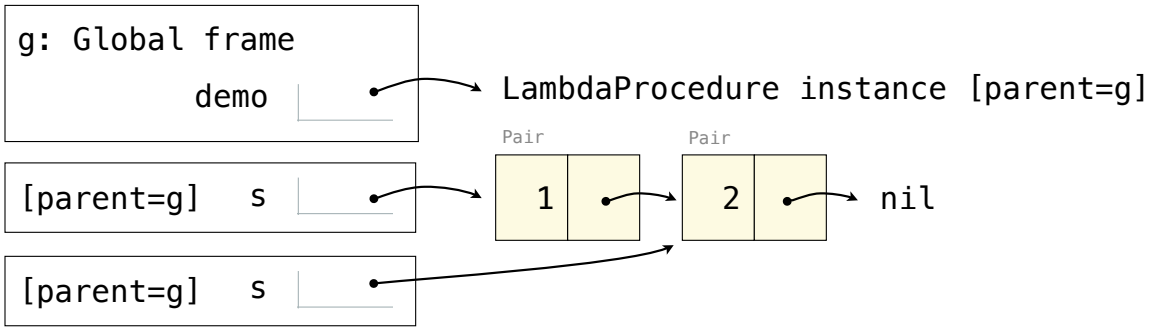

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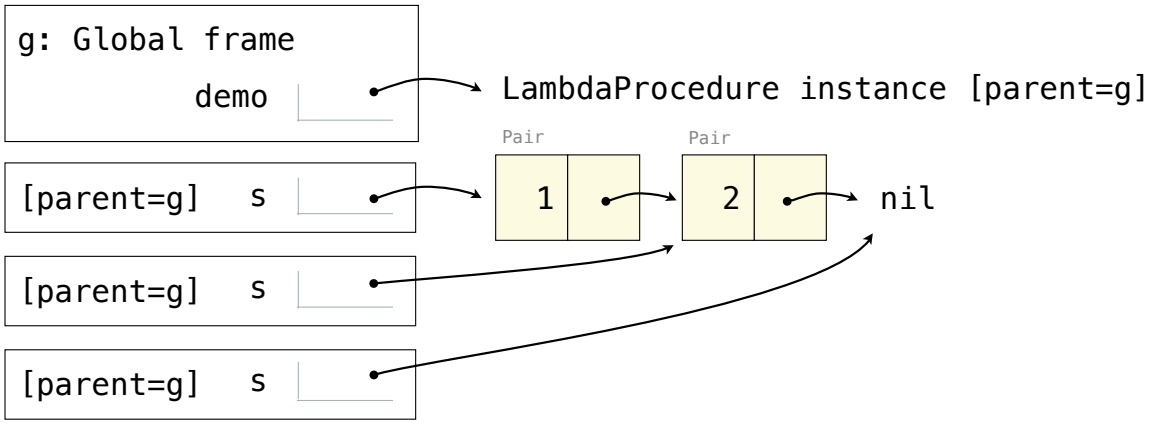

Eval/Apply in Lisp 1.5

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```
apply[fn;x;a] =
      [atom[fn] → [eq[fn;CAR] → caar[x];
                   eq[fn;CDR] → cdar[x];
                   eq[fn;CONS] → cons[car[x];cadr[x]];
                   eq[fn;ATOM] → atom[car[x]];
                   eq[fn;EQ] → eq[car[x];cadr[x]];
                   T → apply[eval[fn;a];x;a]];
       eq[car[fn];LAMBDA] → eval[caddr[fn];pairlis[cadr[fn];x;a]];
       eq[car[fn];LABEL] → apply[caddr[fn];x;cons[cons[cadr[fn];
                                                     caddr[fn]];a]]]
eval[e;a] = [atom[e] → cdr[assoc[e;a]];
      atom[car[e]] →
                [eq[car[e],QUOTE] → cadr[e];
                eq[car[e];COND] → evcon[cdr[e];a];
                T → apply[car[e];evlis[cdr[e];a];a]];
      T → apply[car[e];evlis[cdr[e];a];a]]
```