61A Lecture 24

Monday, March 30

Announcements

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  - Earn back any points you lost on **composition**

Scheme

Scheme is a Dialect of Lisp

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  -Alan Kay, co-inventor of Smalltalk and OOP (from the user interface video)
- "The only computer language that is beautiful."
  -Neal Stephenson, DeNero's favorite sci-fi author

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(Demo)

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Scheme Interpreters

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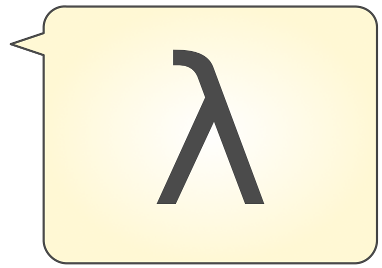

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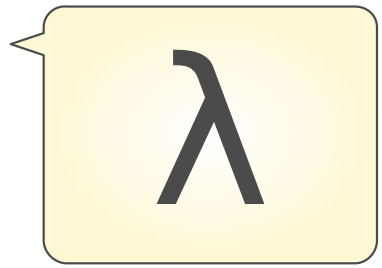

Two equivalent expressions:

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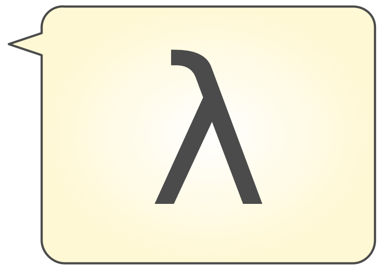

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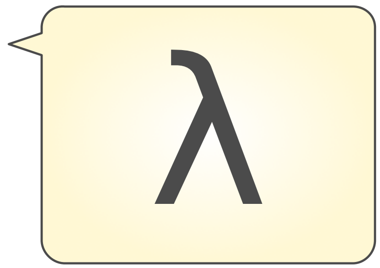

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In the late 1950s, computer scientists used confusing names

- **cons:** Two-argument procedure that creates a pair
- **car:** Procedure that returns the first element of a pair
- **cdr:** Procedure that returns the second element of a pair
- **nil:** The empty list

They also used a non-obvious notation for linked lists

- A (linked) list in Scheme is a pair in which the second element is **nil** or a Scheme list.
- **Important!** Scheme lists are written in parentheses separated by spaces
- A dotted list has any value for the second element of the last pair; maybe not a list!

```
> (define x (cons 1 2))
> x
(1 . 2)
> (car x)
1
> (cdr x)
2
> (cons 1 (cons 2 (cons 3 (cons 4 nil))))
(1 2 3 4)
```

Not a well-formed list!

(Demo)

Symbolic Programming

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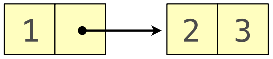

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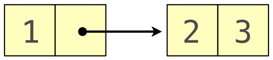

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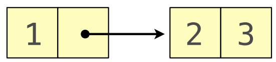

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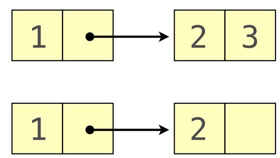

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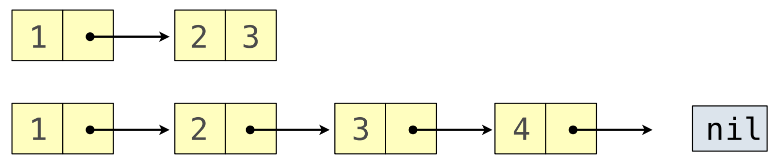

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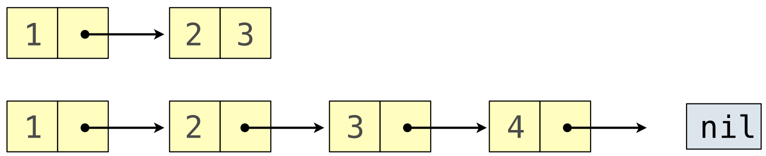

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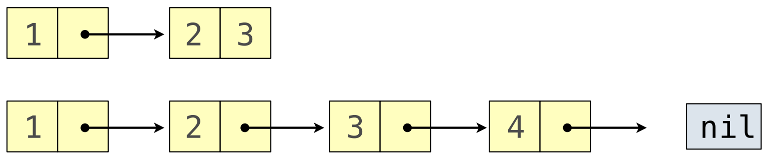

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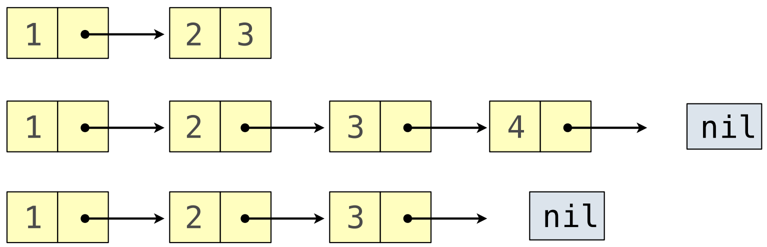

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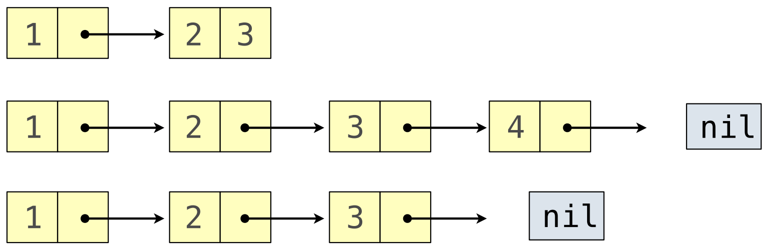

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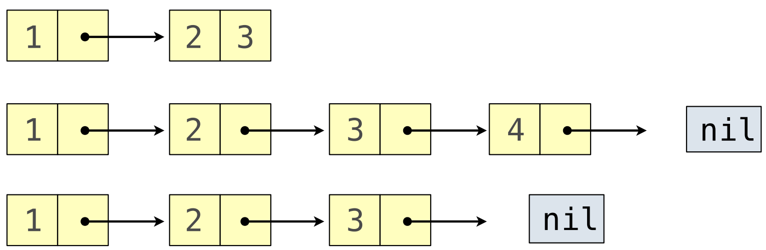

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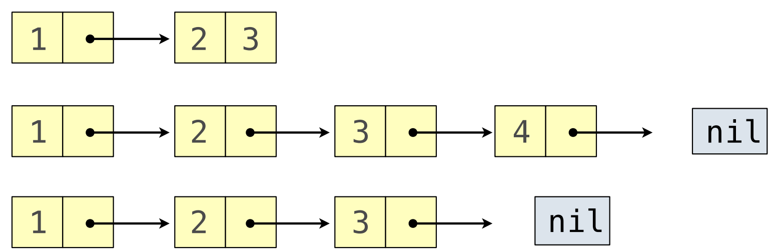

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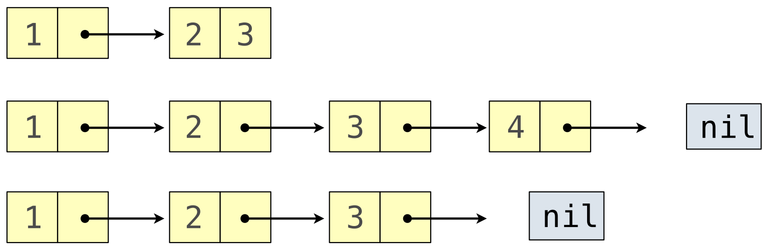

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Sierpinski's Triangle

(Demo)