Local Definitions and Scope
Definitions

- We've seen **global** definitions:
  - `(define answer 42)    ;; "42" is RHS
  - `(define (f x) (+ 1 x))

- Today we'll look at **local** definitions:
  - `(local ((define answer 42)
              (define (f x) (+ 1 x)))
    (f answer))           ;; body
Formalities

- What does the BNF for local definitions look like?
  - \(<\text{exp}> ::= … \mid (\text{local (def})^+ \text{ exp})\)
- Indentation style
- Semantics (informally)
Why "local"?

- Avoiding namespace pollution
  - Example: Our insert sort function
  - This is an example of encapsulation
  - How useful is this concept?
    - Reuse name, avoid complex contracts, organize, hiding implementation detail

- Avoiding repeated work
  - Consider:
    
    ;; last-occurrence:
    ;; x-value, [posn] -> y-value or false
Variables and Scope

- Recall:
  - (local ((define answer₁ 42)
    (define (f₂ x₃) (+ 1 x₄)))
    (f₅ answer₆))

- Variable occurrences: 1-6
- Binding (or defining) occurrences: 1,2,3
- Use occurrences: 4,5,6
- Scopes: 1:(all of local statement), 2:(all of local statement), 3:(+1 x)