Announcements
- Midterm two Tuesday July 29th
- This one will probably be harder than the first
- Colleen will be out of town Thurs-Monday
- I’m leaving before 10am
- Miniproject 3
  - Due Friday July 25th at 11:59 pm

Today
- Tree recursion
- Work on the mini-project
- Tomorrow you’ll do the tree recursion lab

Tree Recursion

more than one recursive call can be made within a recursive case.

What will happen?
- What will `countem` return for n=1, 2, …?

```
(define (countem n)
  (if (= n 0)
    '()
    (se (countem (- n 1))
      n
      (countem (- n 1)))))
```

What will happen?
- What will `mystery` return for n=1, 2, …?

```
(define (mystery n)
  (if (= n 0)
    '()
    (se (mystery (- n 1))
      n
      (mystery (- n 1)))))
```

```scheme
(mystery 0) ➞ '()
(mystery 1) ➞ (se '(' 1 ')' '(') ➞ '('1)
(mystery 2) ➞ (se '('1 2 '('1)) ➞ '('1 2 1)
(mystery 3) ➞ (se '('1 2 1 3 '('1 2 1)) ➞ '('1 2 1 3 1 2 1)
```
Pascal’s Triangle

- How many ways can you choose C things from R choices?
- Coefficients of the (x+y)^R: look in row R
- etc.

```
(define (pascal C R)
  (cond
    ((= C 0) 1) ; base case
    ((= C R) 1) ; base case
    (else       ; tree recurse
      (+ (pascal C    (- R 1))
         (pascal (- C 1) (- R 1))
      )))
```

> (pascal 2 5)
  (pascal 2 5)
    (+
      (pascal 2 4)
        (+
          (pascal 2 3)
            (pascal 1 3)
              (+
                (pascal 1 2)
                  (pascal 0 2))
            (pascal 1 2)
              (+
                (pascal 1 1)
                  (pascal 0 1))))