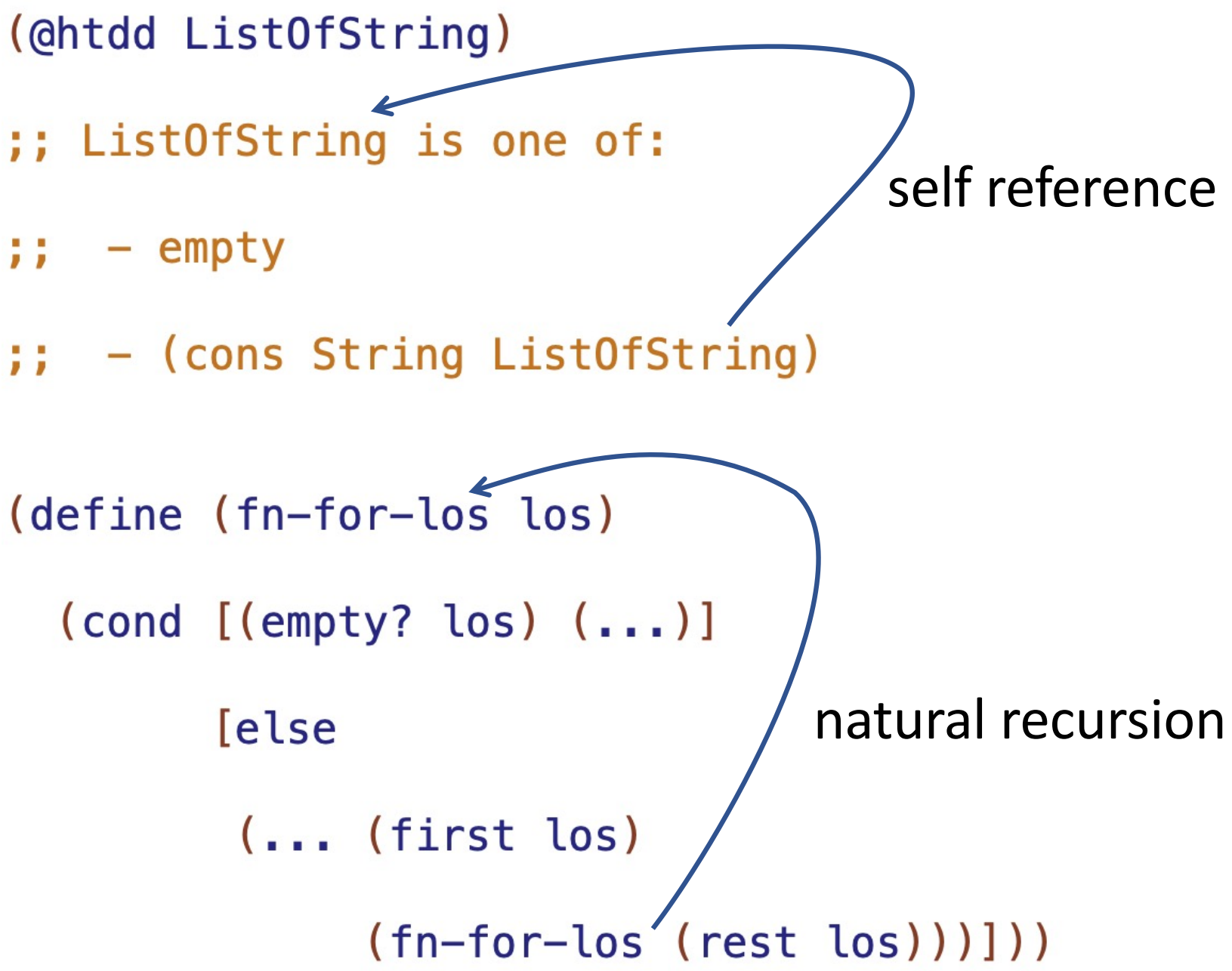
For midterm 1

- I know that the detailed instructions matter, and I will read them this weekend
- I know that the midterm will be mostly autograded.
- I know that if I hand in files with “red errors” that file will receive a 0.
- I know that if I comment out @tags I will lose many points.
- I know that if I don’t follow a problem statement carefully I will lose many points.

A. I would like to get a good grade and will do all the above.
B. Nope, not gonna read the instructions, not going to pay attention to the details, my grade is what it is

```
(@htdd ListOfString)

;; ListOfString is one of:

;;  - empty

;;  - (cons String ListOfString)


(define (fn-for-los los)

  (cond [(empty? los) (...)]

        [else

         (... (first los)

              (fn-for-los (rest los)))]))
```


(@htdd ListOfString)
;; ListOfString is one of:
;; - empty
;; - (cons String ListOfString)
(define (fn-for-los los)
  (cond [(empty? los) (...)]
        [else
         (... (first los)
              (fn-for-los (rest los)))]))
self reference
natural recursion

```
(@template
 (define (contains-canucks? los)
  (cond [(empty? los) (...)]
        [else
         (... (first los)
              (contains-canucks? (rest los)))])))
```

Trusting the Natural Recursion

result of natural recursion will be correct “if and only if”

- correct base case result
- correct contribution of first
- correct combination of contribution and RNR

```
(@template

 (define (contains-canucks? los)

  (cond [(empty? los) (...)]

        [else

         (... (first los)

              (contains-canucks? (rest los)))])))
```

base case result

correct result for empty

combination

how to combine (first los) and result of natural recursion

arbitrary-sized information -> requires well-formed self-referential data definition

```
(@htdd ListOfString)
;; ListOfString is one of:
;;  - empty
;;  - (cons String ListOfString)
```

one of with:

one or more base subclass

one or more self-reference subclasses

arbitrary-sized information -> requires self-referential data definition

```
(@htdf contains-canucks?)
(@signature ListOfString -> Boolean)
;; produce true if los contains "Canucks"
(check-expect (contains-canucks? empty) false)
(check-expect (contains-canucks? (cons "Canucks" (cons "Flames" empty))) true)
(check-expect (contains-canucks? (cons "Flames" (cons "Canucks" empty))) true)
(check-expect (contains-canucks? (cons "Flames" (cons "Leafs" empty)))   false)

;(define (contains-canucks? los) false)

(@template-origin ListOfString)

(@template
 (define (contains-canucks? los)
  (cond [(empty? los) (...)]
        [else
         (... (first los)
              (contains-canucks? (rest los)))])))

(define (contains-canucks? los)
  (cond [(empty? los) false]
        [else
         (if (string=? (first los) "Canucks")
             true
             (contains-canucks? (rest los)))]))
```

test base case first

test 2 long

test recursion on both sides of conditional

rename natural recursion when templating

can "trust the natural recursion" if and only if:

- correct base case result
- correct contribution of first
- correc combination

Function	Base case result	Combination

Function	Base case result	Combination
sum	0	(+ <first> RNR)
product	1	(* <first> RNR)
count	0	(+ 1 RNR)
doubles	empty	(cons (* 2 <first>) RNR)