```
(require spd/tags)
(require 2htdp/image)


;; QUESTION [30 seconds]
;;
;; I understand that during the midterm no questions at all will be
;; answered. None. Zero. No questions. I will read the midterm exam
;; instructions posted to Piazza later today, and ask any questions
;; I have before the exam.
;;
;; A. Yes
;; B. No, I will not read the instructions today even though it
;;    might cause me to fail the midterm.
```

```
#|
QUESTION

Given the following type comments and one template function:
|#

(@htdd Cat)
;; Cat is Number
;; interp. x position of cat in screen coordinates

(define (fn-for-cat c)
  (... c))


(@htdd ListOfCat)
;; ListOfCat is one of:
;;  - empty
;;  - (cons Cat ListOfCat)
;; interp. a list of cats


(define (fn-for-loc loc)
  (cond [(empty? loc) (...)]
        [else
         (... (fn-for-cat (first loc))
              (fn-for-loc (rest loc)))]))

#|
The arrow is a:

A. Self-reference.
B. Reference.
C. Natural recursion.
D. Natural helper.




The colors show the arrow correspondence:

A. Correctly
B. Incorrectly

|#
```

```
;;
;; QUESTION [60 seconds]
;;
;; Given the following data definition,
;;

(@htdd Natural)
;; Natural is one of:
;;  - 0
;;  - (add1 Natural)
;; interp. a natural number
(define N0 0)         ;0
(define N1 (add1 N0)) ;1
(define N2 (add1 N1)) ;2

(@dd-template-rules one-of           ;2 cases
                    atomic-distinct  ;0
                    compound         ;(add1 Natural)
                    self-reference)  ;(sub1 n) is Natural

(define (fn-for-natural n)
  (cond [(zero? n) (...)]
        [else
         (... ;n                       ;template rules would not normally
                                       ;put this here, but we will see that
                                       ;we would otherwise almost always end
                                       ;up having to add it
          (fn-for-natural (sub1 n)))]))

;; Natural is a well-formed self-referential data definition because:

;; A. It has a base case.
;; B. It has a self-referential case.
;; C. It has a base case and a self-referential case.
;; D. It uses add1.
```

```
;; QUESTION [30 seconds]
;;
;; A self-referential data definition for natural numbers makes sense because:
;;
;; A. Zero is the base case.
;; B. It's easy to create example data.
;; C. There are an arbitrary number of natural numbers.
```

```
;; QUESTION [30 seconds]
;;
;; I spent this many hours so far preparing for the midterm:
;;
;; A. more than 15
;; B. 10 to 15
;; C.  7 to 10
;; D.  3 to 7
;; E. less than 3
```

```
;; QUESTION [20 seconds]
;;
;; I thought the midterm was:
;;
;; A. much harder than expected
;; B.      harder than expected
;; C. about as hard as expected
;; D.      easier than expected
;; E. much easier than expected
;;
```