UNOFFICIAL QUIZ *for* PRACTICE

QUIZ 8

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This quiz will not count towards your grade. It exists to simply gauge your understanding. You will have 10 minutes to complete this quiz. In that timespan, your goal is to complete one question and at least attempt the other two.

01. WARM UP

Complete the following functions.

```
; new_map returns a new list containing the results of the function f
; applied to all elements, in reverse order of l
(define (map_and_reverse f l)

  (if (null? l)

    l

    (append (map_and_reverse f (cdr l)) (list (f (car l))))))

(map (lambda (x) (* x 2)) '(1 2 3 4))
;expect (8 6 4 2)


; swap every pair, so that list (1 2 3 4) becomes (2 1 4 3)
(define (swap_pairs l)

  (cond ((null? l) l)

    ((null? (cdr l)) l)

    (else (

      (cons (car (cdr l)) (cons (car l) (swap_pairs (cdr (cdr l))))))))

(swap_pairs '(1 2 3 4 5))
;expect (2 1 4 3 5)
```

02. ANGIE'S RECITAL

Angie has an upcoming recital in November, and her repertoire consists of k songs. However, she needs your help. The recital is limited to n minutes, and she can only perform two songs, where the second song is longer than the first. Assuming each song's name is an integer equal to its duration in minutes, write a function that outputs all possible sets that Angie could use for her recital.

```
; assume that list of songs is in increasing order
(possible_sets 5 '(1 2 3 4 5 6 7))
;expect ((1 4) (2 3))

(possible_sets 100 '(1 2 3 4 5 6 7))
;expect ()
```

Assume that you have `map` function above, and a Python-esque `sum` function at your disposal. Not all lines may be needed.

```
(define (possible_sets n songs)

  (if (null? songs) songs

  (append (possible_sets_helper (car songs) (- n (car songs)) (cdr songs))

    (possible_sets n (cdr songs))))

)



(define (possible_sets_helper i n songs)

  (cond ((null? songs) songs)

    ((= (car songs) n) (cons

      (list i (car songs))

      (possible_sets_helper i n (cdr songs))))

    (else (possible_sets_helper i n (cdr songs)))))
```