1 Question 1

Exercise

Create a function \texttt{count-even-strings} that consumes a (listof Str) and returns a list containing all the strings in the list that have even length.

\[(\texttt{count-even-strings (list "ab" "abc" "abcd")}) \Rightarrow (\texttt{list "ab" "abcd"}).\]

2 Question 2

Exercise

Write a function \texttt{(part-sums L)} that consumes a (listof Num), and returns a list of the same length, where each value is replaced by the sum of itself and all the values that come after it.

\[(\texttt{part-sums (list 2 3 5 7 9)}) \Rightarrow (\texttt{list 26 24 21 16 9})\]

Hint

You can tell if a list if empty with the \texttt{empty?} predicate.

\[(\texttt{empty? ()}) \Rightarrow \texttt{#true}\]

\[(\texttt{empty? (list 2 3 5)}) \Rightarrow \texttt{#false}\]

3 Question 3

One way of sorting a list is to repeatedly swap adjacent out-of-order values in a list, until the list is in order. Each swap increases how sorted it is. After enough swaps, the list will be sorted.

For example, start at the right in \texttt{(list 11 5 13 7)}.

• Compare the last two values, 13 and 7. 13 > 7, so swap the last two values, giving \texttt{(list 11 5 7 13)}.

• Compare the second from last pair, 5 and 7. 5 < 7, so do nothing; still \texttt{(list 11 5 7 13)}.

• Compare the third from last pair, 11 and 5. 11 > 5, so swap these values, giving \texttt{(list 5 11 7 13)}.

By “bubbling” through the list once, \texttt{(list 11 5 13 7)} became \texttt{(list 5 11 7 13)}, which is better sorted. Bubbling this list again gives \texttt{(list 5 7 11 13)}, which is sorted.

Using \texttt{foldr}, write a function \texttt{bubble} that consumes a (listof Num), and returns the result of one pass of swapping out-of-order items in the list, \texttt{starting at the right}.

\[(\texttt{bubble (list 1 2 3 4)}) \Rightarrow (\texttt{list 1 2 3 4})\]

\[(\texttt{bubble (list 11 5 13 7)}) \Rightarrow (\texttt{list 5 11 7 13})\]

\[(\texttt{bubble (list 2 6 9 7 4 2 5 7)}) \Rightarrow (\texttt{list 2 2 6 9 7 4 5 7})\]

Exercise

In the file that contains \texttt{bubble}, type in this program, and test it.
(define (bsort L)
  (foldr (lambda (a b) (bubble b))
    L
    (range 0 (length L) 1)))
Ex. Trace the code, and try to figure out why it works.

4 Question 4

Exercise Write a function (add-back-distance L) that add to each value in L the distance to the end of the list. For example,

(add-back-distance (list 10 15 20))
=> (list (+ 10 2) (+ 15 1) (+ 20 0))
=> (list 12 16 20)