Due February 3, 5:00 p.m.

Problem 1

Write a procedure named each-matched-pair? that takes three inputs: lists lst1 and lst2 and a binary predicate called pred?.

The each-matched-pair? procedure applies pred? to each corresponding pair of members of lst1 and lst2, e.g., if lst1 is '(1 2 3) and lst2 is '(a b c), it evaluates (pred? '1 'a), (pred? '2 'b), and (pred? '3 'c).

The each-matched-pair? procedure returns #t if pred? returns #t each and every time; otherwise it returns #f. If lst1 and lst2 have different lengths, each-matched-pair? ignores the extra members at the end of the longer list.

(each-matched-pair? '(1 5 3 9) '(2 7 4 9) <=) ⇒ #t
(each-matched-pair? '(1 7 3 9) '(2 5 4 9) <=) ⇒ #f
(each-matched-pair? '(a b c) () equal?) ⇒ #t
(each-matched-pair? '() '(a b c) equal?) ⇒ #t

Problem 2

Write a procedure named each-within-n? that takes three inputs: lists lst1 and lst2 and an integer n. It returns #t if each corresponding pair of members of lst1 and lst2 differ by n or less, regardless of which numbers is greater than the other. Otherwise, each-within-n? returns the Boolean value #f. You should use the procedure each-matched-pair? in your definition.

Problem 3

Write a Scheme procedure called map-successive-pairs that takes as input a list called lst and a procedure called fun (which takes two arguments). The procedure map-successive-pairs applies fun to each successive pair of members of lst, i.e., it applies fun to the first and second members of lst, the second and third members, the third and fourth members, and so on. The procedure map-successive-pairs returns a list composed of the results of these applications of fun. The length of the output list will be one less than the length of the input list.

(map-successive-pairs '(2 4 6 8) -) ⇒ (-2 -2 -2)
(map-successive-pairs '(2 4 6 8) +) ⇒ (6 10 14)

Problem 4

Write a Scheme procedure called uniformly-spaced? that takes a list of numbers as input and returns #t if each number on the list differs from the previous one by the same amount. If the
input list has fewer than two members, then uniformly-spaced? returns #t. Otherwise, it returns #f. You should use the procedures map-successive-pairs and each-successive-pair? in your definition.

Submitting

Don’t forget to submit your work using the submit101 command!

    submit101 g-asmt05 asmt05

(If the name of your directory is different from asmt05, change asmt05 to whatever the name of your directory is.)