Prove that (stream->listn integers n) returns the integers \{1,2,3,\ldots,n\}

(define ones (stream-cons 1 ones))
(define integers (stream-cons 1 (add-streams ones integers)))

Assume that stream->listn, add-streams, stream-cons work correctly

Base case: n=1

[integers]
(1 . {promise to evaluate (add-streams ones integers)})

When n=1, the first element of integers will correctly be the first integer 1.

Inductive Hypothesis:
Assume (stream->listn integers k) returns the integers \{1,2,3,\ldots,k\} for all k < n

Inductive Step:

NOS: (stream->listn integers n) returns the integers \{1,2,3,\ldots,n\}

Because integers is defined as (stream-cons 1 (add-streams ones integers), as shown above in the base case, the n’th element of integers will be the n-1’th element of (add-streams ones integers). Assuming that add-streams works correctly, the n-1’th element of (add-streams ones integers) will be given by [the n-1’th element of ones] + [the n-1’th element of integers]. The n-1’th element of ones is simply 1 as it is a stream of all 1’s. By IH, the n-1’th element of integers is equal to n-1. Thus, the n-1’th element of (add-streams ones integers) will be (n-1)+1 = n. This is the n’th element of integers, and the previous elements are correct by IH, thus (stream->listn integers n) returns the integers \{1,2,3,\ldots,n\}.