**Q 10.4** (pg. 150 *Cracking the Coding Interview, 6th Edition*)

You are given an array-like data structure Listy which lacks a size method. It does, however, have an elementAt(i) method that returns the element at index i in O(1) time. If i is beyond the bounds of the data structure, it returns -1. (For this reason, the data structure only supports positive integers). Given a Listy which contains sorted, positive integers, find the index at which an element x occurs. If x occurs multiple times, you may return any index.

*Hint 1*:Think about how binary search works. What will be the issue with just implement binary search?

*Hint 2*: Binary search requires comparing an element to a midpoint. Getting the midpoint requires knowing the length. We don’t know the length. Can we find it?

*Hint 3*: We can find the length by using exponential backoff. First check index 2, then index 4, then 8, then 16, and so on. What will be the runtime of the algorithm?