

```

1 def MaxIndex(L):
    # Pre: L is a nonempty list of integers
    # Post: Returns the highest index of the smallest
    #       (integer) element in L
    i = 0
    j = len(L)-1
    while i < j:
        if L[i] < L[j]:
            j = j-1
        else:
            i = i+1
    return j

```

p1-MaxIndex.py

Step 1: Let x refer to the highest index of the smallest element in L .

Loop Invariant:

LI(a): $i \leq x \leq j < \text{len}(L)$

Step 3: Suppose our LI holds and that our program terminates. Then, after some iteration, the condition of the while loop fails i.e., we will have $i \geq j$. Using LI(a), we have $i \leq x \leq j$. Thus, $i = j$ and so $i = x = j$. By the last line of the program, we return j , and so we are also returning x which is what we wanted to return (recall how we defined x).

Step 4: Define an expression e via $e := j - i$.