COMP 681 Formal Methods Spring 2008 Recitation 16

1. The following algorithm takes an array A (say, of characters) and returns `true` if the contents of the array form a palindrome, that is, if they read the same left to right as right to left; otherwise, it returns `false`. Examples of palindromes include (excluding blanks and commas and ignoring case differences) "civic" and "a man, a plan, a canal, Panama". Prove the correctness of this algorithm using weak induction. Be sure to attach the appropriate assertions.

```
PALINDROM(A)
1  left ← 1
2  right ← LENGTH[A}
3  while left < right
4     do  if  A[left] ≠ A[right]
5             then  return false
6         left ← left + 1
7         right ← right - 1
8  return true
```

2. The following algorithm copies all non-negative elements in array A of integers into array B, which it returns, For example, if A is [3,-1,4,0,-1,5], then [3,4,0,5] is returned. Prove the correctness of this algorithm using the method of loop invariants and well-founded sets. Be sure to attach the appropriate assertions.

```
NON-NEG-COPY(A)
1  i ← 1
2  j ← 0
3  while i ≤ LENGTH[A]
4      do  if A[i] ≥ 0
5               then  j ← j + 1
6                     B[j] ← A[i]
7          i ← i + 1
8  return B
```