# Sorts & Search Worksheet
### practice for exam

1. Assume that A is an array of N integers and that variable k has a value in the range 0 <= k < N. Also assume that the following assertion is true:

   for all j, 0 <= j < k, A[j] < A[j+1]

   Which of the following is a valid conclusion?

   A) All elements of A are in increasing order.
   B) All elements of A are in decreasing order.
   C) Elements 0 through k of A are in increasing order.
   D) Elements 0 through k of A are in decreasing order.
   E) The smallest value in A is stored in A[0].

2. Consider the following code segment:

```
int[]  A;
A = Initialize();                    // initializes A with elements

int k;
for (k=0; k<A.length; k++)
        Swap (A,  k,  (A.length – k – 1) );
```

   Assume that method Swap interchanges the values of the locations within A.
   Which of the following best characterizes the effect of the for loop?

   A) It sorts the elements of A.
   B) It reverses the elements of A.
   C) It reverses the order of the first half of A and leaves the second half unchanged.
   D) It reverses the order of the second half of A and leaves the first half unchanged.
   E) It leaves all of the elements of A in their original order.

3. Consider searching for a given value in a sorted array. Under which of the following circumstances will sequential search be faster than binary search?
   A) The value is not in the array.
   B) The value is in the first element of the array.
   C) The value is in the last element of the array.
   D) The value is in the middle element of the array.
   E) Sequential search will never be faster than binary search.

4. Consider writing a method named Index to search an array of integers for a given value v. If v is in the array, the method should return the index of the first element with value v; otherwise, the method should return –1;

The following code is an **incorrect** implementation of method Index:

```
int Index(int[] A, int v)
{
        int k=0;
        while ( (A[k] != v)  &&  (k < A.length) )
                k++;
        if (k == A.length)
                return –1;
        return k;
}
```

Which of the following best characterizes the conditions under which this version of method Index does **not** work correctly owing to an out-of-bounds array access?

a) always
b) whenever v is in the array
c) whenever v is not in the array
d) whenever v is the first element in the array
e) whenever v is the last element in the array

5. Consider the task of sorting elements of an array in ascending order. Which of the following statements are true?

I. Selection Sort always requires more comparisons than Insertion Sort.
II. Insertion Sort always requires more moves than Selection Sort.
III. Insertion Sort, on average, requires more moves than Selection Sort.

a) I only
b) II only
c) III only
d) I and II only
e) II and III only

6. Using a binary search on the following sorted elements:

4 6 7 9 11 13 17 19 25 31 38 39 40 42 46 48 50 51 53 57

a) searching for which element would exit the search the quickest?

b) searching for which element(s) in the vector would keep the search looking for the element the longest?

c) when searching for 42, what other elements will be looked at?