

CS101 – Computer Programming
Quiz for Tuesday – 23 September 2014

Q1. Consider the following recursive function written by a novice programmer for sorting elements of an array 'A' having number of elements 'n', using a selection sort technique in ascending order. Assume that the function 'selectionsort' is called from the main program in the following way: 'selectionsort(A,0,0,n,1);'

```
void selectionsort(int A[], int i, int j, int n, int flag){
    int t;
    if (i < n - 1){
        if (flag){
            j = i + 1;
        }
        if (j < n){
            if (A[i] > A[j]){
                t = A[i];
                A[i] = A[j];
                A[j] = t;
            }
            selectionsort(A, i, j + 1, n, 0);
        }
        selectionsort(A, i + 1, 0, n, 1);
    }
}
```

You are told that the above function may contain errors and not sort the numbers properly. You are required to choose from the alternative choices given below so that the function sorts the numbers correctly in ascending order for all 'n' input values.

Options

- A. If the condition in the 3rd if statement in the function given above, is changed from 'j < n' to 'j < n-1', the function will sort properly
- B. Both the recursive calls in the above function need to be interchanged
- C. If the condition in the 2nd if statement in the function goiven above, is changed from 'flag' to '!flag', the function will sort properly.
- D. None of the above

Q2. You are required to assume the following for the given code snippet on merging two arrays :

- 1. Variables 'i','j','k','M', and 'N' are all declared to be of type 'int'
- 2. Variables 'flag1' and 'flag2' are both declared to be of type 'bool';
- 3. Arrays 'A[]','B[]', and 'C[]' are all declared to be 'int' arrays
- 4. Variables 'M' and 'N' store the number of elements of arrays 'A[]' and 'B[]' respectively. The values of both 'M' and 'N' are ≥ 1 .
- 5. 'M' and 'N' elements are stored in arrays 'A[]' and 'B[]' respectively
- 6. The elements of arrays 'A[]' and 'B[]' are sorted in descending order.
- 7. The program compiles correctly with all the above necessary declarations

// Code Snippet for Merging the two arrays

```
i = 0; j = 0; k = 0;
while((i < M) && (j < N)){
    if(A[i] > B[j]) {
        C[k] = A[i];
        i++;
        k++;
    }
    else{
        C[k] = B[j];
        j++;
        k++;
    }
}

if (flag1) {
    for (; i < M; i++) {
        C[k] = A[i]; k++;
    }
}

if (flag2) {
    for (; j < N; j++) {
        C[k] = B[j]; k++;
    }
}
```

Which (one or more) of the following options is correct on completion of execution of the above code snippet?

Options

- A. If both flag1 and flag2 are true, then C will contain the sorted (in descending order) merged array.
- B. If flag1 is true and flag2 is false, then for no input arrays A and B, will C contain the sorted (in descending order) merged array.
- C. If flag1 is false and flag2 is true, then for some input arrays A and B, C will contain the sorted (in descending order) merged array.
- D. If both flag1 and flag2 are false, then for no input arrays A and B, will C contain the sorted (in descending order) merged array.
- E. None of the above