CSCI803 Assignment

Yao Xiao
SID 2019180015

October 9, 2020

1 Problem 1

1.1 Question A

We can choose counting sort which runs in O(n) time and it is a stable sorting algorithm.

1.2 Question B

We can execute Quicksort-Partition one pass around around the pivot (x=0). If it is a Lomuto partition, it will place all 0 elements on the left and all 1 elements on the right. This will also sort the array. After that, it is in place and has a O(n) running time.

Here is the pseudocode:

```
i = 0
for j = 1 to n
if A[j] <= 0
then i = i + 1
swap(A[i], A[j])
```

1.3 Question C

We can choose insertion sort which is an in place sorting algorithm and is also stable. We can consider the situation ($A[i] = A[j]$ and $i < j$). Since i < j, the priority $A[i]$ will be added to the sorted array $A[1 \cdots i-1]$ by moving in the correct position.

2 Problem 2