

CSE 202 Final

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I. QUESTION (SORTING) (15 POINTS)

Suppose you are given two sorted arrays A and B. Write a function that finds elements in A / B (the elements that are in A but not in B) in $\mathcal{O}(N)$ time.

```
int[] difference(int[] A, int[] B)
```

II. QUESTION (SORTING) (15 POINTS)

Suppose you are given an array of N integers containing the birth years of students. Write an $\mathcal{O}(N)$ algorithm to sort these birth years.

```
void sortBirthYears(int[] A)
```

III. QUESTION (SORTING) (20 POINTS)

Suppose you are given a linked list of N integers to be sorted. Write an $\mathcal{O}(N)$ algorithm that checks if the linked list is already sorted.

```
boolean isSorted(LinkedList A)
```

IV. QUESTION (LINKED LIST) (15 POINTS)

Suppose you are given a linked list of N integers that are sorted. Write an algorithm to remove duplicate elements from that sorted linked list.

```
void removeDuplicates(LinkedList A)
```

V. QUESTION (TREES) (15 POINTS)

Write a function that computes the number of super nodes in a binary search tree. A node is super if its key is the sum of the keys of its children.

```
int numberOfSuperNodes()
```

VI. QUESTION (GRAPH) (20 POINTS)

A node in a web graph is called a hub, if it has more incoming edges than outgoing edges. Write a method that finds the number of hubs in a graph. Write the function for both adjacency list and adjacency matrix representations.

```
int numberOfHubs()
```