CSE 202 Bütünleme Exam

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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 $\triangle$ B = (A - B) $\cup$ (B - A) (the elements that are in A but not in B and the elements that are in B but not in A) in $\mathcal{O}(N)$ time.

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

II. QUESTION (SORTING) (20 POINTS)

Suppose you are given an array of N integers. Write an $\mathcal{O}(N \log N)$ algorithm that find the minimum difference between any two elements in this array.

```
int minDifference(int[] A)
```

III. QUESTION (SORTING) (15 POINTS)

Suppose you are given an unsorted array of N integers and two numbers X and Y (Assume $X < Y$). Write an $\mathcal{O}(N)$ algorithm to partition the numbers in the array such that, the numbers that are smaller than X will be in the first part, the numbers that are larger than X but smaller than Y will be in the second part, and the numbers that are larger than Y will be in the third part.

```
void partition(int[] A, int X, int Y)
```

IV. QUESTION (LINKED LIST) (15 POINTS)

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

```
void removeSingles(LinkedList A)
```

V. QUESTION (TREES) (15 POINTS)

Write a function that finds the difference between the number of leftist nodes and rightist nodes in a binary search tree. A node is leftist (rightist) if it has only left (right) child.

```
int leftistOrRightist()
```

VI. QUESTION (GRAPH) (20 POINTS)

A node in a web graph is called a source, if it has no incoming edges. Write a method that finds the number of sources in a graph. Write the function for both adjacency list and adjacency matrix representations.

```
int numberOfSources()
```