Determining DNA Health

HackerRank

DNA is a nucleic acid present in the bodies of living things. Each piece of DNA contains a number of *genes*, some of which are beneficial and increase the DNA's *total health*. Each gene has a *health value*, and the *total health* of a DNA is the sum of the health values of all the beneficial genes that occur as a substring in the DNA. We represent genes and DNA as non-empty strings of lowercase English alphabetic letters, and the same gene may appear multiple times as a susbtring of a DNA.

Given the following:

- An array of beneficial gene strings, $genes = [g_0, g_1, \ldots, g_{n-1}]$. Note that these gene sequences are *not* guaranteed to be distinct.
- An array of gene health values, $health = [h_0, h_1, \ldots, h_{n-1}]$, where each h_i is the health value for gene g_i.
- A set of s DNA strands where the definition of each strand has three components, $start$, end, and d, where string d is a DNA for which genes $g_{start}, \ldots, g_{end}$ are healthy.

Find and print the respective total healths of the *unhealthiest* (minimum total health) and *healthiest* (maximum total health) strands of DNA as two space-separated values on a single line.

Input Format

The first line contains an integer, n, denoting the total number of genes.
The second line contains n space-separated strings describing the respective values of $g_0, g_1, \ldots, g_{n-1}$ (i.e., the elements of $genes$).
The third line contains n space-separated integers describing the respective values of $h_0, h_1, \ldots, h_{n-1}$ (i.e., the elements of $health$).
The fourth line contains an integer, s, denoting the number of strands of DNA to process.
Each of the s subsequent lines describes a DNA strand in the form `start end d`, denoting that the healthy genes for DNA strand d are $g_{start}, \ldots, g_{end}$ and their respective correlated health values are $h_{start}, \ldots, h_{end}$.

Constraints

- $1 \leq n, s \leq 10^5$
- $0 \leq h_i \leq 10^7$
- $0 \leq first \leq last < n$
- $1 \leq$ the sum of the lengths of all genes and DNA strands $\leq 2 \times 10^6$
- It is guaranteed that each g_i consists of lowercase English alphabetic letters only (i.e., `a` to `z`).

Output Format

Print two space-separated integers describing the respective total health of the *unhealthiest* and the *healthiest* strands of DNA.

Sample Input 0

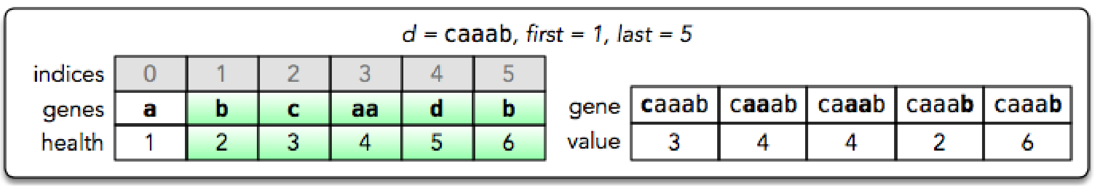
```
6
a b c aa d b
1 2 3 4 5 6
3
1 5 caaab
0 4 xyz
2 4 bcdybc
```

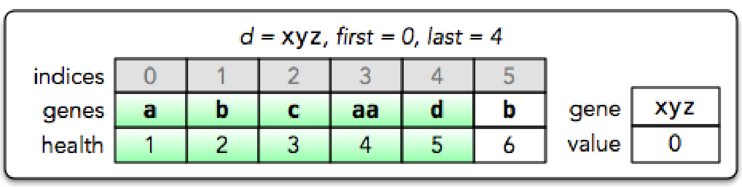
Sample Output 0

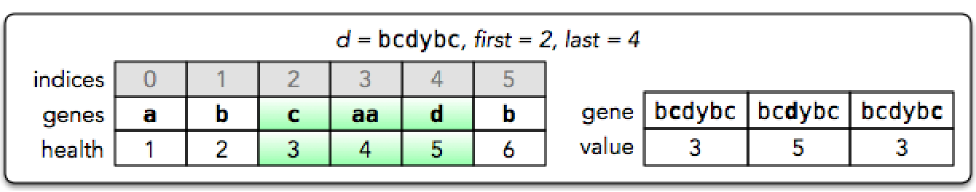
```
0 19
```

Explanation 0

In the diagrams below, the ranges of beneficial genes for a specific DNA on the left are highlighed in *green* and individual instances of beneficial genes on the right are bolded. The total healths of the $s = 3$ strands are:

1. 

The total health of `caaab` is $3 + 4 + 4 + 2 + 6 = 19$.
2. 

The total health of `xyz` is 0, because it contains no beneficial genes.
3. 

The total health of `bcdybc` is $3 + 5 + 3 = 11$.

The unhealthiest DNA strand is `xyz` with a total health of 0, and the healthiest DNA strand is `caaab` with a total health of 19. Thus, we print `0 19` as our answer.