Betting Simulation

Grace is comparing betting strategies by replaying the same sequence of N coin flips for each one. The outcomes are given as a string of `H` (heads) and `T` (tails).

The S competing betting strategies are numbered 1 through S in input order. Each strategy processes the flips independently and in order. For strategy j and flip i (from 1 to N), let $g_{j,i}$ be its *guess* and $s_{j,i}$ be its *stake*.

Every strategy starts with the same balance B_0 and must always keep its balance at or above a minimum balance M. When processing flip i, a strategy acts as follows:

- If placing the bet could drop the balance below M in the worst case, the bet is **skipped** and the balance is unchanged. Concretely, the bet is placed only if (current balance) $- s_{j,i} \geq M$.
- Otherwise the bet is placed. If the guess $g_{j,i}$ matches the actual flip outcome, the strategy wins and the balance increases by $s_{j,i}$. If the guess is wrong, the balance decreases by $s_{j,i}$.

After all N flips have been processed, each strategy has a final balance. Help Grace determine which strategy ends with the largest final balance. If several strategies tie for the largest final balance, choose the one with the smallest index.

Input

The first line contains four integers N, S, B_0, and M: the number of flips, the number of strategies, the starting balance, and the minimum balance. They satisfy $1 \leq N \leq 2000$, $1 \leq S \leq 2000$, $N \cdot S \leq 100\,000$, and $0 \leq M \leq B_0 \leq 10^6$.

The second line contains a string of exactly N characters, each `H` or `T`, giving the flip outcomes.

For each j from 1 through S, the next line describes strategy j and contains exactly $2N$ tokens:

$$g_{j,1}\ s_{j,1}\ g_{j,2}\ s_{j,2}\ \cdots\ g_{j,N}\ s_{j,N}.$$

Each $g_{j,i}$ is a single character `H` or `T`, and each integer stake $s_{j,i}$ satisfies $0 \leq s_{j,i} \leq 10^6$.

Under these constraints, every balance is between M and $B_0 + N \cdot 10^6 \leq 2\,001\,000\,000$.

Output

Output two space-separated integers: the index of the strategy with the largest final balance (smallest index on ties), followed by that strategy's final balance. The first strategy in the input has index 1.

Sample Input 1

```
3 2 20 10
HTH
H 10 H 5 T 50
H 5 T 5 H 5
```

Sample Output 1

```
2 35
```

Sample Input 2

```
2 2 5 0
TT
T 3 T 4
H 100 H 100
```

Sample Output 2

```
1 12
```

Sample Input 3

```
1 2 10 0
H
H 5
H 5
```

Sample Output 3

```
1 15
```