Greetings From Globussoft

- Given below are 5 Programming questions, you have to solve any 3 out of 5 questions.

- These 5 questions you can attempt in any technology like C/C++, java, .Net, PHP

- To solve these 3 questions you've max. 3 hours.

- While Solving these questions you are not allowed to use any Search Engine like Google, Yahoo, Bing ...

All the best for your test

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QUESTION - 1

Penney's game is a simple game typically played by two players. One version of the game calls for each player to choose a unique three-coin sequence such as **HEADS TAILS HEADS (HTH)**. A fair coin is tossed sequentially some number of times until one of the two sequences appears. The player who chose the first sequence to appear wins the game.

For this problem, you will write a program that implements a variation on the Penney Game. You willread a sequence of 40 coin tosses and determine how many times each three-coin sequence appears. Obviously there are eight such three-coin sequences: **TTT**, **TTH**, **THT**, **THH**, **HTT**, **HTH**, **HHT** and **HHH**. Sequences may overlap. For example, if all 40 coin tosses are heads, then the sequence HHH appears 38 times.

Input

The first line of input contains a single integer P, ($1 \leq P \leq 1000$), which is the number of data sets that follow. Each data set consists of 2 lines. The first line contains the data set number N. The second line contains the sequence of 40 coin tosses. Each toss is represented as an upper case H or an upper case T, for heads or tails, respectively. There will be no spaces on any input line.

Output

For each data set there is one line of output. It contains the data set number followed by a single space, followed by the number of occurrences of each three-coin sequence, in the order shown above, with a space between each one. There should be a total of 9 space separated decimal integers on each output line.

Example

Input:

```
4
1
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
2
TTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTT
3
HHTTTHHTTTHTHHTHHTTHTTTHHHTHTTHTTHTTTHTH
4
HTHTHHHTHHHTHTHHHHTTTHTTTTTHHTTTTHTHHHHT
```

Output:

```
1 0 0 0 0 0 0 0 38
2 38 0 0 0 0 0 0 0
3 4 7 6 4 7 4 5 1
4 6 3 4 5 3 6 5 6
```

QUESTION – 2

Bob has unusual problem. In Byteland we can find a lot of hills and cities. King of Byteland ordered Bob to deliver magic balls from one city to another. Unfortunately, Bob has to deliver many magic balls, so walking with them would take too much time for him. Bob came up with great idea - catapulting them.

Byteland is divided into intervals. Each interval contains city and hill.

Bob can catapult magic ball accurately from city A to city B, if between them there isn't higher hill than A's hill.

Input

Every test case contains N and M (N<=50000) (M<=50000), number of intervals and number of balls.

In next line there's N numbers H(H<=10^9) separated by one space.

In next M lines numbers A and B (1<=A,B<=N), number of city from which we want to catapult the ball and number of city to which we want to catapult the ball.

Output

Write one number - number of magic balls that Bob can catapult successfully.

Example

Input:
```
7 3
2 3 5 4 2 1 6
3 5
2 5
4 6
```

Output:
```
2
```

QUESTION – 3

John had a chocolate bar with the size of 2^i. At his birthday party, he shared this chocolate bar to his friend. But his friend just wanted to taste a piece of this chocolate bar which had the length of N (1<=N<=10^18) so that John had to break this

chocolate bar into pieces to get the piece for his friend.Unfortunately, this chocolate bar was so breakable that John just can break it into half each time.
Help him find the smallest length of the chocolate bar that he needs and the minimum times of breaking the chocolate bar to get the piece for his friend.

Input

T - the number of test cases
In each of the next T lines, there is one numbers N

Output

For every test case, print one line the length of the chocolate bar and the minimum number of times to break the bar.

Example

```
Input:
3
8
5
7

Output:
8 0
8 3
8 3
```

QUESTION – 4

A cube free number is a number who's none of the divisor is a cube number(A cube number is a cube of a integer like 8(2*2*2) , 27(3*3*3)). So cube free numbers are 1,2,3,4,5,6,7,9,10,11,12,13,14,15,17,18 etc(we will consider 1 as cube free). 8,16,24,27,32 etc are not cube free number. So the position of 1 among the cube free numbers is 1, position of 2 is 2, 3 is 3 and position of 10 is 9. Given a positive number you have to say if its a cube free number and if yes then tell its position among cube free numbers.

Input:

First line of the test case will be the number of test case T(1<=T<=100000) . Then T lines follows. On each line you will find a integer number n(1<=n<=1000000).

Output:

For each input line, print a line containing "Case I: ", where I is the test case number. Then if it is not a cube free number then print "Not Cube Free". Otherwise print its position among the cube free numbers.

Sample Input:

10

1

2

3

4

5

6

7

8

9

10

Sample Output:

Case 1: 1

Case 2: 2

Case 3: 3

Case 4: 4

Case 5: 5

Case 6: 6

Case 7: 7

Case 8: Not Cube Free

Case 9: 8

Case 10: 9

QUESTION – 5

We want to pick a certain number of people from a group of N people and make them play a game of tug of war!

Then, we would like to split these people into two teams.

Afterwards, an intense game of tug of war would start.

However, when the strength of each team is not equivalent, the game is not very fun. A team's strength is the sum of the strengths of the people in the team.

Since you want the game that is fun, it is necessary to determine if it is possible to pick some people and split them into two teams such that the two teams' strengths are equal.

Input

The input consists of a number of test cases.

The first line is the number of test case, T. (1<=T<=200)

Each case starts with N (1<=N<=100,000), the total number of people.

The next line consists of N integers, separated by a space. The ith integer indicates the strength of the ith person. These integers are less than 100, but larger than 0.

Output

For each test case, output "YES" if it is possible to pick some people from the group and separate into two teams of equal strengths. If not, output "NO". Refer to the sample test cases for further clarifications.

Example

Input:

```
2
4
10 20 30 40
3
10 18 15
```

Output:

```
YES
NO
```