Problem A. FibTree

There is a bidirectional graph G with N vertices and M edges.

The weight of each edge is either 0 or 1.

You are asked to answer whether it is possible to find a spanning tree T such that f(T) is a fibonacci number.

f(T) is defined as the sum of all edges in T.

Fibonacci number is defined as 1,2,3,5,8,....

Input

The first line contains two integers N and M.($1 \leq N \leq 10^5, 0 \leq M \leq 10^6$)

Then M lines follow, each contains three integers u,v,c indicating an edge between u and v with weight c.($1 \leq u, v \leq N, 0 \leq c \leq 1$)

Output

Output Yes or No to answer the question.

Example

standard input	standard output
5 7 3 5 1 4 1 1 4 1 1 3 2 0 4 4 1 1 4 0 4 2 0	Yes

Note

The graph may have multiple edges and loops.

For more information, please read the example carefully.

Problem B. Strings

Alif and yww are playing a game on a string S, consisting of uppercase letters. They play the game in turn, and who could not operate loses the game. Alif turns first.

In each turn, there is a set $T = \{s[1], s[2], ..., s[n]\}$, which are all subsequences of S. Initially, T only contains an empty string($T = \{\emptyset\}$) In each turn, one can choose a string $s[i]$ and erase $s[i]$ from the set, and then insert at least one string into set T, which are all obeying the following principles:

1. Obeying the form $s[i] + C$.

2. $s[i] + C$ is also a subsequence of S.

3. The strings we added once are all different.

For example, $S = abaaab$, $T = \{aa\}$. We can choose the substring aa and erase it($T = \emptyset$), and then add aaa and aab into the set($T = \{aaa, aab\}$).

Since Alif and yww are smart enough, they will always make the greatest strategy. Your task is to determine who will win the game.

Input

The first line contains a string S.

Output

The first line contains a name, Alif or yww, representing the winner.

Examples

standard input	standard output
A	Alif
AA	yww
ABABA	Alif
ABAAB	Alif
AAABAAABBB	Alif

Note

$1 \leq |S| \leq 10^5$

Problem C. More and more

Luckily, you've arrived at a relic during your expedition. There are N treasures arranged in a row, numbered from 1 from left to right, and each one contains a_i gold coins. Because of some mysterious force, a_i can be negative.

You can choose some index i, and start to collect the gold coins from the $i-th$ treasures. Because of your habit, you move from left to right. When you are at some treasure, you can choose to collect the a_i gold coins and move on, or stop your collection and leave here.

As a mage, you can cast spells, so that for **at most** M disjoint consecutive treasures, the number of gold coins will become X times. Of course, you can also make no change at all.

So, what is the maximum gold coins you can collect finally?

Note that you must collect at least one treasure.

Note, if you change treasures [1 2 3], you can think you choose 1 consecutive treasures [1 2 3], or 2——[1 2][3], or 3——[1][2][3], all of these are valid.

Input

The first line contains three integers N, M and X ($1 \leq N \leq 3 \cdot 10^5$, $1 \leq M \leq 30$, $-10^4 \leq X \leq 10^4$) – the number of treasures, the most disjoint consecutive treasures you can change, and the integer X respectively.

The second line contains N integers $a_1, a_2, \cdots, a_n$($-10^5 \leq a_i \leq 10^5$), – the number of coins in each treasure.

Output

Print one integer — the maximum gold coins you can collect.

Examples

standard input	standard output
5 3 3 -1 -2 -3 -4 -5	-1
5 2 3 4 -1 6 -2 -1	29
5 1 3 4 -1 6 -2 -1	27

Note

In the first test case, you should make no change and collect the first treasure.

In the second test case, you can make two consecutive treasures [1] and [3 4 5], so that the gold coins will become 12, -1, 18, -6, -3, then you can collect the $1st$ to the $3rd$ treasures, and get 29 coins.

Problem D. Sakuya's task

Sakuya has just become Master in Mathforces. Hearing this news, Flandre gives her a task to test if she is a true master.

The task is to calculate $\sum_{i=1}^{n}\sum_{j=1}^{n}\phi(gcd(i,j))$ module 10^9+7.

Sakuya fails to solve this task in 2 seconds even though she uses The World. So she asks you to help her.

Input

The only line contains an integer n ($1 \le n \le 10^{10}$).

Output

Print a single line containing one integer —— The answer to the task.

Example

standard input	standard output
4	18

Note

Euler's totient function $\phi(n)$ counts how many positive integers from 1 to n are coprime (relatively prime) to n.

$gcd(a,b)$ means the greatest common divisor of a and b.

Problem E. Election

Ninel Kingdom is about to hold the queen election! There are n cities in the kingdom, connected by $n-1$ roads, so there is only one path between any two cities.

The incumbent queen Lilith will deliver a speech in every city. Lilith has a_i supporters in city i. During every speech there is a round of voting. Assume that Lilith is in city i. For every city j, a representative will be sent to city i and visit each city along the path. If there are k cities whose number of supporters is strictly larger than that of city j, then city j will cast k votes to Lilith. City i will not participate in this round. The votes of this round are the sum of each city's votes. The total votes are the sum of all n rounds. Now Lilith wants to know the total votes she will get. Notice that the number of supporters won't change during the election.

Input

The first line contains an integer $n (1 \le n \le 3 \cdot 10^5)$, the number of cities in the kingdom.

The second line contains n integers $a_1, a_2, ..., a_n (0 \le a_i \le 2^{31} - 1)$, the number of supporters in every city;

The i-th of the following $n-1$ lines contains two integers u_i and $v_i (1 \le u_i, v_i \le n, u_i \ne v_i)$ denoting that there exists a road connecting city u_i and v_i. It is guaranteed that there is only one path between any two cities;

Output

Output one line with one integer, denoting the total votes Lilith will get.

Example

standard input	standard output
10 1 2 3 4 5 6 7 8 9 10 1 2 1 3 3 4 3 5 3 7 2 9 2 10 2 6 2 8	55

Note

Here is the voting situation in the example.

speech in city	1	2	3	4	5	6	7	8	9	10	$\sum$
votes of round	0	1	2	5	6	6	8	8	9	10	55

Problem F. Charmander and His Best Friends

Charmander invited his best friends to his house, now they are playing an interesting game!

Charmander has n friends, the i-th friend's height is i. To play this game, they need to stand in one line with a strange restriction. That is, for each friend, the average of every two friends who have the same distance to him can't equal to his height. Can you help him to find a solution?

Formally, you need to construct a permutation h such that for every $1 \le i, j \le n, 1 \le i - j \le i + j \le n$,$h_{i-j} + h_{i+j} \neq 2h_i$

Input

Only one line, contains one positive integer $n(1 \le n \le 50000)$.

Output

Only one line, contains a permutation from 1 to n which satisfies the restriction. It can be proved that such a solution exists.

Example

standard input	standard output
3	1 3 2