

Sumotonic Sequences

Input file: **standard input**
Output file: **standard output**
Time limit: 5 seconds
Memory limit: 1024 megabytes

A sequence of integers is called **monotonic** if it is either nondecreasing or nonincreasing. A sequence is **sumotonic** if it can be expressed as a sum of any number of monotonic sequences, all having only non-negative values.

You are given a sequence $A = (a_1, \dots, a_n)$ and a list of k operations. Each operation adds an arithmetic sequence to some segment of A . More precisely, for a given interval $[p, q]$ and integers s and d , the elements a_p, a_{p+1}, \dots, a_q are changed to $a_p + s, a_{p+1} + s + d, \dots, a_q + s + (q - p) \cdot d$.

Determine if A is sumotonic, for the initial sequence and after each operation. Note that the operations are persistent (they have a permanent effect on the sequence A).

Input

The first line of input contains the number of test cases Z ($1 \leq Z \leq 10\,000$). The descriptions of the test cases follow.

The first line of each test case contains integers n and k ($2 \leq n \leq 200\,000$, $1 \leq k \leq 200\,000$) – the length of the sequence and the number of operations respectively.

The second line contains initial elements a_1, \dots, a_n of the sequence A ($1 \leq a_i \leq 2 \cdot 10^9$ for $i = 1, 2, \dots, n$).

The last k lines contain operations, each described by four integers p, q, s, d ($1 \leq p \leq q \leq n$, $1 \leq s, d \leq 10\,000$), meaning that to the interval $[p, q]$ we add an arithmetic sequence with starting element s and difference d .

The sum of $n + k$ over all test cases does not exceed 400 000.

Output

For each test case, output $k + 1$ lines. The first one should contain the text “YES“ if the initial sequence is sumotonic, “NO“ otherwise. Each of the remaining k lines should similarly describe the state of the sequence after every operation.

Example

standard input	standard output
1	NO
5 2	NO
5 8 5 2 4	YES
5 5 6 6	
2 4 1 3	