

Problem C. The Wave

Time limit 1500 ms

Code length Limit 50000 B

OS Linux

Read problems statements in [Mandarin Chinese](#), [Russian](#), [Vietnamese](#) and [Bengali](#) as well.

Chef is stuck in the wavey world of polynomials. You are given all N roots of a polynomial $P(x) = \prod_{i=1}^N (x - a_i)$. The roots are pairwise distinct integers, but they are not given in any particular order.

To help Chef escape, you should answer Q queries (numbered 1 through Q). For each valid i , in the i -th query, you are given an integer x_i and you have to determine whether $P(x_i)$ is positive, negative or 0.

Input

- The first line of the input contains two space-separated integers N and Q .
- The second line contains N space-separated integers a_1, a_2, \dots, a_N .
- Q lines follow. For each valid i , the i -th of these lines contains a single integer x_i describing the i -th query.

Output

For each query, print a single line containing the string `"POSITIVE"`, `"NEGATIVE"` or `"0"` (without quotes) describing the value of the polynomial for the i -th query.

Constraints

- $1 \leq N, Q \leq 2 \cdot 10^5$
- $|a_i| \leq 10^9$ for each valid i
- a_1, a_2, \dots, a_N are pairwise distinct
- $|x_i| \leq 10^9$ for each valid i

Sample 1

Input	Output
4 6 1 3 5 100 -2 2 4 80 107 5	POSITIVE NEGATIVE POSITIVE NEGATIVE POSITIVE 0

The given polynomial is $(x - 1) \cdot (x - 3) \cdot (x - 5) \cdot (x - 100)$.

Query 1: $x = -2$. This means that $P(-2) = (-2 - 1) \cdot (-2 - 3) \cdot (-2 - 5) \cdot (-2 - 100) = (-3) \cdot (-5) \cdot (-7) \cdot (-102) = 10710 > 0$. Thus, the answer is **POSITIVE**.

Query 2: $x = 2$. This means that $P(2) = (2 - 1) \cdot (2 - 3) \cdot (2 - 5) \cdot (2 - 100) = (1) \cdot (-1) \cdot (-3) \cdot (-98) = -294 < 0$. Thus, the answer is **NEGATIVE**.

Query 3: $x = 4$. This means that $P(4) = (4 - 1) \cdot (4 - 3) \cdot (4 - 5) \cdot (4 - 100) = (3) \cdot (1) \cdot (-1) \cdot (-96) = 288 > 0$. Thus, the answer is **POSITIVE**.

Query 6: $x = 5$. This means that $P(5) = (5 - 1) \cdot (5 - 3) \cdot (5 - 5) \cdot (5 - 100) = (4) \cdot (2) \cdot (0) \cdot (-95) = 0$. Thus, the answer is **0**.