DMOPC '19 Contest 3 P0 - What is it?

Time limit: 2.0s **Memory limit:** 256M

Veshy needs help in math class. He has N sequences of 10 spaced terms in order of $a_1, a_2, \ldots, a_{10}$. For each sequence, he wants to know if it is arithmetic, geometric, or neither. Output the answer to the i^{th} sequence on the i^{th} line. Terms are guaranteed to be integers.

Note:
An arithmetic sequence is a sequence such that it can be written in the form: $a, a+d, a+2d, \ldots$ where a and d are constants.
A geometric sequence is a sequence such that it can be written in the form: $a, ar, ar^2, \ldots$ where a and r are constants.

It may be helpful to know that in an arithmetic sequence, $a_i + a_{i+2} = 2a_{i+1}$ and in a geometric sequence, $g_i \cdot g_{i+2} = g_{i+1}^2$.

Constraints

$1 \leq N \leq 100$
$-10^9 \leq a_i \leq 10^9$

Input Specification

The first line of input is N.
Each of the following N lines contains 10 integers, $a_1, a_2, \ldots, a_{10}$, a sequence of numbers.

Output Specification

Your output must have N lines such that the answer to the i^{th} sequence is on the i^{th} line.
If the sequence is arithmetic, output `arithmetic`.
If the sequence is geometric, output `geometric`.
If the sequence is neither arithmetic nor geometric, output `neither`.
If the sequence is both arithmetic and geometric, output `both`.

Sample Input

```
4
1 2 3 4 5 6 7 8 9 10
2 4 8 16 32 64 128 256 512 1024
1 1 0 0 1 1 0 0 1 1
1 1 1 1 1 1 1 1 1 1
```

Sample Output

```
arithmetic
geometric
neither
both
```