

Exam Room

Input file: **standard input**
Output file: **standard output**
Time limit: 1.5 seconds
Memory limit: 256 megabytes

Busy Beaver is hosting an upcoming exam for his students in the MITIT exam room. Due to last-minute preparation and bad testing, the students will need to come up to him to complain about things like bad difficulty distributions, server issues, misleading statements, and awful flavortexts without disturbing other students, so he needs to ensure that the seats are well separated.

The room has N seats at points $P_i = (x_i, y_i)$, with Busy Beaver's desk located at $O = (0, 0)$. He wants to choose a nonempty subset of the seats satisfying the following condition:

- Each seat in the subset is strictly closer to Busy Beaver's desk than any other seat in the subset. Formally, for all pairs P_i, P_j ($i \neq j$) in the subset, $\text{dist}(P_i, P_j) > \text{dist}(O, P_i)$, where dist denotes Euclidean distance.

How many nonempty subsets satisfy this criterion? Since the answer may be enormous, output it modulo 998 244 353.

Input

The first line contains a single integer N ($1 \leq N \leq 500$).

The i -th of the next N lines contains two integers x_i and y_i ($-10^9 \leq x_i, y_i \leq 10^9$).

All N points in the input are distinct and not equal to $(0, 0)$.

Output

Output a single integer — the number of valid nonempty subsets modulo 998 244 353.

Scoring

There are four subtasks for this problem.

- (10 points): N does not exceed 15.
- (10 points): N does not exceed 24.
- (10 points): N does not exceed 80.
- (70 points): No additional constraints.

Examples

standard input	standard output
2 1 2 2 1	2
3 1 2 2 1 1 -3	5

Note

In the first sample, the two desks are $\sqrt{2}$ apart and $\sqrt{5}$ away from the origin, so either one or the other can be used.

In the second sample, the third desk is $\sqrt{10}$ away from the origin and $\sqrt{17}$ away from the closest other desk, so the third desk can always be used. The valid subsets are:

$\{\text{desk 1}\}, \{\text{desk 2}\}, \{\text{desk 3}\}, \{\text{desk 1, desk 3}\}, \{\text{desk 2, desk 3}\}.$