**CODEFORCES** $^\beta$
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## Assignment 2

# A. The Driver

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Amer is a Microbus driver, but he is a very conservative man. He doesn't like males sitting next to females in his vehicle.



Amer's Microbus consists of three seats. The first one, the nearest to the driver's seat, consists of three spots for the passengers. The second one got three spots also. And the last one consists of four spots.

The passengers get into the microbus in order. Each passenger chooses a seat with at least one available spot and sits on the leftmost available spot in this seat.

Amer wants to know if it is possible for the microbus not to have any males sitting next to females.

### Input
The first line of input will contain $T$ ( $1 \le T \le 1024$ ), the number of test cases. Each test case consists of string $S$ of length $10$, contains only $F$ and $M$ (Female and Male respectively), the leftmost character indicates the first to enter and the rightmost indicates the last to enter

### Output
For each test case, print $Yes$ if there's a way that satisfies Amer's requirement, $No$ otherwise.

### Example

| input | Copy |
|---|---|
| 3<br>FFFFMMMMM<br>MMMFFFFFFF<br>MFFFFFFFFF | |

| output | Copy |
|---|---|
| Yes<br>Yes<br>No | |

# B. Mathematics for Computing I

<div align="center">

time limit per test: 1 second

memory limit per test: 256 megabytes

input: standard input

output: standard output

</div>

Sohieb is joining the $CSC1707$ Mathematics for Computing class. In his first lecture he learned about the Factorial. In mathematics, the factorial of a non-negative integer $n$, denoted by $n!$, is the product of all positive integers less than or equal to $n$. For example,

$$5! = 5 * 4 * 3 * 2 * 1 = 120$$

Now Sohieb has to do some homework, and of course the homework is to compute the factorial of some number. However his teacher is a kind man so he only asked him to write how many trilling zeros this factorial contains. For example, $5! = 120$ so it contains only one trilling zero but $14! = 87178291200$ which contains two trilling zeros.

And of course as you all know, Sohieb is a super lazy student, so he asked you to help him solving this homework.

## Input

The first the only line of the input contains a single integer number $n$, ($1 \le n \le 1000$ ).

## Output

Print in the only line of output an integer, which is the number of trilling zeros for $n!$.

## Examples

| input | Copy |
|---|---|
| 5 | |

| output | Copy |
|---|---|
| 1 | |

| input | Copy |
|---|---|
| 1 | |

| output | Copy |
|---|---|
| 0 | |

| input | Copy |
|---|---|
| 14 | |

| output | Copy |
|---|---|
| 2 | |

| input | Copy |
|---|---|
| 26 | |

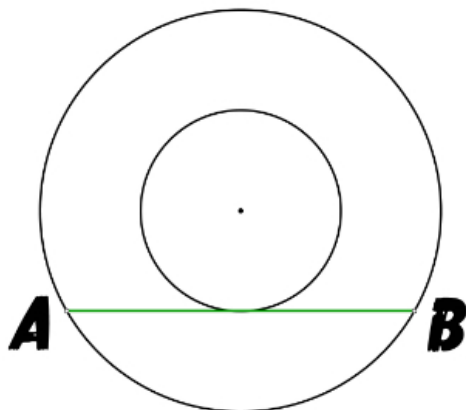| output | Copy |
|---|---|
| 6 | |

# C. Abdelkarim and Sister

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Abdelkarim was finally home after a long day. He was really tired and wanted to sleep when his little sister asked him this question. Given the area between 2 circles centered at the same point, find the length of the line segment that is a tangent of the inner circle and touches the perimeter of the outer circle. (i.e. the green line segment AB in the following picture).



Help him answer the question so that he could sleep.

## Input

The first and only line of input contains a real number with 9 digits after the decimal point $A$ ($0 \le A \le 10^9$) — the area between the two circles.

## Output

Print a real number — the length of the line segment described above. The answer will be considered correct if the absolute or relative error does not exceed $10^{-9}$.

## Examples

input | Copy
---
1.000000000

output | Copy
---
1.128379167096

input | Copy
---
100.000000000

output | Copy
---
11.283791670955

# D. Geometry

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Geometry is a very important field in mathematics, Squares and rectangles are essential shapes in geometry, both of them have 4 right angles, but a square is a special case of a rectangle where width and height are the same.

The figure below shows a square on the left and a rectangle on the right:
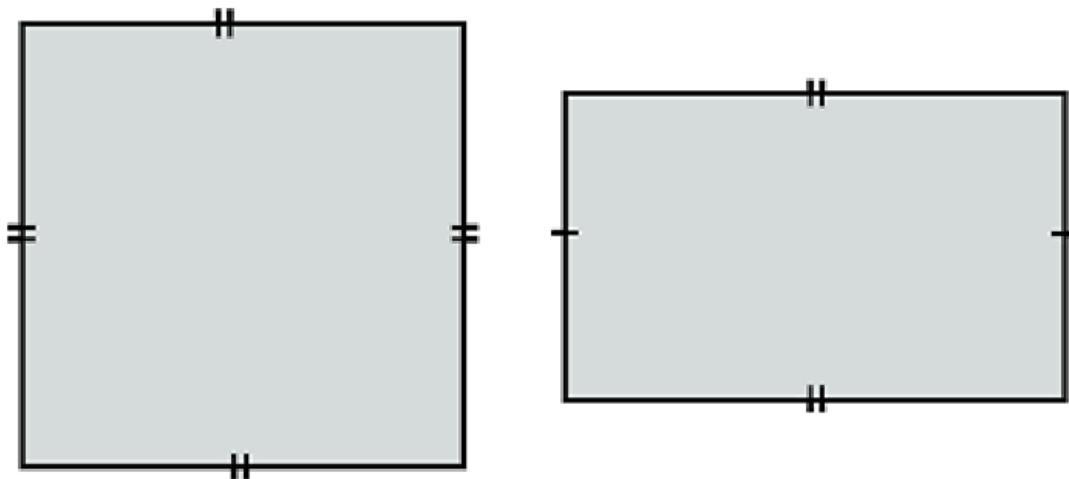


If you have the width and the height of a 4 right angled shape, can you figure out if it is a square or a rectangle?

## Input
The first and the only line of input contains the two integers $(1 \le w, h \le 1000000)$ representing width and height, respectively.

## Output
Print one line consists of $Square$ if the shape is a square, otherwise print $Rectangle$ if it is a rectangle.

## Examples

| input | Copy |
|---|---|
| 10 10 | |
| **output** | Copy |
| Square | |

| input | Copy |
|---|---|
| 13 200 | |
| **output** | Copy |
| Rectangle | |

| input | Copy |
|---|---|
| 300 300 | |
| **output** | Copy |
| Square | |

# E. Logo

time limit per test: 2.0 s
memory limit per test: 64 MB
input: standard input
output: standard output

As you may know the UNAL logo (see the figure) is pretty usable for everything in the UNAL documents, for this reason we ask you to make a simplified version of this logo for any size needed.

Formally, the simplified version of the logo of size $m$ consist of an 'u' (composed by 3 lines of equal length) and a 'n' (composed by 3 lines of equal length) and there is exactly one space between the 'u' and the 'n', to simplify even more the logo each line is made just by the character '*' $m$ times (wihtout quotation marks)

### Input

A single number $m$ $(3 \le m \le 50)$, the size of the logo

### Output

$m$ lines with the resulting simplified logo of the UNAL

### Examples

| input | Copy |
|---|---|
| 3 | |

| output | Copy |
|---|---|
| ``` * * *** * * * * *** * * ``` | |

| input | Copy |
|---|---|
| 4 | |

| output | Copy |
|---|---|
| ``` *  * **** *  *  * *  *  * **** *  * ``` | |

# F. Salem

time limit per test: 1.0 s
memory limit per test: 1024 MB
input: standard input
output: standard output

Salem is known to be one of the best competitive programmers in the region. However, he always finds a hard time understanding the concept of the hamming distance. The hamming distance of two numbers is defined as the number of different digits in their binary representations (leading zeros are used if necessary to make the binary representations have the same length). For example the hamming distance between 12 and 5 is 2 since their binary representations are 1100 and 0101 respectively and they differ in the first and fourth positions.

Recently, Salem got a problem that he needs your help to solve. He is given $N$ integers and asked to get the maximum among the hamming distances of all possible pairs of the given integers.

### Input

The first line of the input will be a single integer $T$ representing the number of test cases. Followed by $T$ test cases. Each test case will start with a line with single integer $(2 \leq N \leq 100)$ representing the number of the integers. Each of the following $N$ lines contains one of the integers $(1 \leq A_i \leq 10,000)$ from the list of the integers.

### Output

For each test case print one line consists of one integer representing the maximum hamming distance between all possible pairs from the given integers.

### Examples

| input | Copy |
|---|---|
| 2<br>2<br>12<br>5<br>3<br>1<br>2<br>3 | |

| output | Copy |
|---|---|
| 2<br>2 | |

# G. Duff and Meat

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Duff is addicted to meat! Malek wants to keep her happy for $n$ days. In order to be happy in $i$-th day, she needs to eat exactly $a_i$ kilograms of meat.

There is a big shop uptown and Malek wants to buy meat for her from there. In $i$-th day, they sell meat for $p_i$ dollars per kilogram. Malek knows all numbers $a_1, ..., a_n$ and $p_1, ..., p_n$. In each day, he can buy arbitrary amount of meat, also he can keep some meat he has for the future.

Malek is a little tired from cooking meat, so he asked for your help. Help him to minimize the total money he spends to keep Duff happy for $n$ days.

## Input

The first line of input contains integer $n$ ($1 \le n \le 10^5$), the number of days.

In the next $n$ lines, $i$-th line contains two integers $a_i$ and $p_i$ ($1 \le a_i, p_i \le 100$), the amount of meat Duff needs and the cost of meat in that day.

## Output

Print the minimum money needed to keep Duff happy for $n$ days, in one line.

## Examples

| input | Copy |
|---|---|
| 3<br>1 3<br>2 2<br>3 1 | |

| output | Copy |
|---|---|
| 10 | |

| input | Copy |
|---|---|
| 3<br>1 3<br>2 1<br>3 2 | |

| output | Copy |
|---|---|
| 8 | |

## Note

In the first sample case: An optimal way would be to buy 1 kg on the first day, 2 kg on the second day and 3 kg on the third day.

In the second sample case: An optimal way would be to buy 1 kg on the first day and 5 kg (needed meat for the second and third day) on the second day.

# H. Rectangles

time limit per test: 2.0 s

memory limit per test: 64 MB

input: standard input

output: standard output

You have $N$ rectangles, all of their sides are either parallel to $X$ axis or to $Y$ axis, and you want to cover them all using one big rectangle.

what is the minimum area of the big rectangle you need in order to cover all the rectangles.

## Input

The first line contains number of test cases $T$

Each test case consists of an integer $N$ ($1 \le N \le 1000$), followed by $N$ lines, each line describes a rectangle with four pairs of integers representing the $X$ coordinate and $Y$ coordinate of the vertices. $-1000 \le X coordinate, Y coordinate \le 1000$

## Output

For each test case print one integer which is the size of the rectangular cover.

## Examples

| input | Copy |
|---|---|
| 2<br>1<br>1 1 2 2 2 1 1 2<br>2<br>0 0 10 5 0 5 10 0<br>0 1 1 1 1 0 0 0 | |

| output | Copy |
|---|---|
| 1<br>50 | |

# I. Paradise City

time limit per test: 1.0 s

memory limit per test: 256 MB

input: standard input

output: standard output

Noura has been looking for a restaurant to host the SCPC2015 celebration in Lattakia, she decided that the best method to pick a restaurant is according to the number of contestants that are living near it. Given a grid representing the map of Lattakia, each 3x3 cells represent a district, each district will consist of 3x3 areas. The center of each district is a restaurant (X), other cells can be:

  '.' denotes an empty block.
  '*' denotes a block full of people (4 persons)

Help Noura decide which restaurant to choose by finding the maximum number of students living in a district.

**Input**

The first line of input contains an integer $T$ $(1 \leq T \leq 256)$, the number of test cases.

The first line of each test case contains an integer $N$ $(1 \leq N \leq 100)$, the number of districts. Then follows three lines, each consists of $3 \times N$ characters, representing the map of the city of $N$ districts.

**Output**

For each test case, print the maximum number of students living in a district on a single line.

**Examples**

| input | Copy |
|---|---|
| 3<br>3<br>***...***<br>.X.\*X\*.X.<br>***...***<br>2<br>\*.\*.\*.<br>.X..X\*<br>\*.\*.\*.<br>3<br>.\*...\*\*\*\*<br>\*X\*\*X\*\*X\*<br>...\*..\*.\* | |

| output | Copy |
|---|---|
| 24<br>16<br>28 | |

**Note**

Warning: large Input/Output data, be careful with certain languages.

# J. Another Square in the Floor

time limit per test: 1.0 s
memory limit per test: 256 MB
input: standard input
output: standard output

While planning the SCPC2015 contest floor, each team has been assigned an area of a rectangular shape. The area covers the maximum region the team is allowed to move around during the contest.

When Noura saw the contest floor, she didn't like the rectangular shapes. She asked the organizers to reassign each team for a square shaped area instead of a rectangular one.

Given the sides of a rectangle, help the organizers find the square with minimum area, that covers the rectangle. To make it easier for the organizers, each side of the square must be parallel to one of the sides of the rectangle.

## Input

The first line of input contains an integer $T$ ($1 \leq T \leq 1024$), the number of test cases.

Each test case contains two space-separated integers $X, Y$ ($1 \leq X, Y \leq 1000$), the dimensions of the rectangular shaped area.

## Output

For each test case, print on a single line, the area of the square described in the problem statement.

## Examples

| input | Copy |
|---|---|
| 3<br>3 3<br>5 7<br>12 6 | |

| output | Copy |
|---|---|
| 9<br>49<br>144 | |

## Note

Warning: large Input/Output data, be careful with certain languages.

# K. Lunch Break

time limit per test: 1.5 s
memory limit per test: 256 MB
input: standard input
output: standard output

Hasan decided to invite his colleagues and buy them lunch from his favorite restaurant. As usual, he got carried away and forgot to order early, for that he decided to help the delivery guy.

There are 3 different roads that the delivery guy can choose from. Given the length of each road, what is the best one that he can choose to deliver the food as soon as possible?

## Input

The first line of the input contains an integer $T$ $(1 \leq T \leq 10^5)$, where T is the number of the test cases.

Each test case has one line that contains three **distinct** integers $a$, $b$ and $c$ $(1 \leq a, b, c \leq 10^9)$, the lengths of the three different roads from the restaurant to Hasan's company.

## Output

For each test case, print `"First"` (without quotations) if the delivery guy should choose the first road, `"Second"` (without quotations) if he should choose the second road, `"Third"` (without quotations) if he should choose the third way.

## Example

| input | Copy |
|---|---|
| 3<br>5 10 7<br>20 3 9<br>8 15 2 | |

| output | Copy |
|---|---|
| First<br>Second<br>Third | |

# L. Hey JUDgE

time limit per test: 1.0 s
memory limit per test: 256 MB
input: standard input
output: standard output

Since Judge Nicole Hosh moved to Egypt for her Computer Science Masters in AASTMT, in 2014, she has been training with coach Fegla and attending his camps in Egypt. She, also, set a number of problems for TCPC and JCPC and was a judge in LCPC and SCPC. Her best friend Noura was so proud of her so she was trying to convince her to start writing Codeforces Div. 2 round. After various attempts to convince her, Nicole finally agreed, and so, she started collecting some problems with different difficulties from her ex-contestant friends.

Judge Nicole collected 7 ideas for problems of different levels, she wants to create 5 problems for the next contest, one for each difficulty level, from A to E (difficulty 1 to 5). Given the difficulty level of the problems she currently has, she can merge the ideas of two problems, one of level $x$, and the other of level $y$ to get a problem of level $x + y$.

For example, Judge Nicole can merge two problems of difficulties A and D, to get one problem of difficulty E $(1 + 4 = 5)$.

Merging more than two problems into one will produce a problem with a long statement which is hard to explain, so she won't do this (i.e., each problem is merged with another at most once). Also, she can't merge a resultant problem again, and she can't use the same problem twice.

## Input
The first line of input contains an integer $T (1 \le T \le 330)$, the number of test cases.

Each test case will contain only one string $S$ of length 7. Each letter of the string represents the difficulty level of a problem (from A to E), 'A' is the easiest and 'E' is the hardest.

## Output
For each test case print "YES" if she can prepare a contest using the current problems, otherwise print "NO".

## Examples

| input | Copy |
|---|---|

```
3
EBEABDA
CEDEACA
BDAAEAA
```

| output | Copy |
|---|---|

```
YES
NO
YES
```

## Note
Warning: large Input/Output data, be careful with certain languages.

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