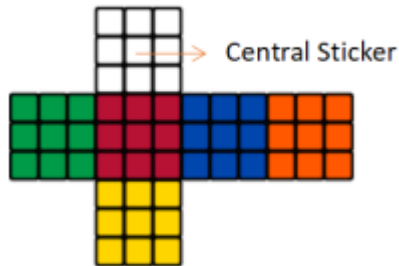# Assignment 1

Problem 1 Rubik's Cube

The classic Rubik's Cube had 6 faces, each covered by 9 stickers. No matter how you turn the Rubik's Cube, each face has its color, as they are all determined by the sticker's color in the middle, which does not change. You are required to figure out the color of each face.

The following are the faces of the Rubik's Cube:

Input

The first line of input contains a single integer T $(0 < T \leq 100)$ as the number of *test cases (测试样例)*.

For each test case, there are 3 lines. Each line contains 3 upper case English letters, separated by a single blank, showing the stickers.

Input sample

```
2
A B C
D E F
G H I

Y Y Y
Y Y Y
Y Y Y
```

Output

For each test case, print only one upper-case English letter to show the color of the face.

Output Sample

```
E
Y
```

Hint

The **2** in the first line indicates 2 test cases in the input. Then follows 2 3*3 blocks represent 2 faces. The first face is as follows:

Since the letter **E** is in the middle, you need to print E .

Problem 2 GPA Calculator

Alex chooses many courses this semester, but he doesn't know how to calculate his average GPA. He gives you the grades and corresponding credits of each of his classes and asks you to help him.

Here is how grades correspond to GPA:

Score	GPA
$90 \leq score \leq 100$	4.0
$80 \leq score < 90$	3.0
$70 \leq score < 80$	2.0
$60 \leq score < 70$	1.0
$0 \leq score < 60$	0.0

Input

The first line contains a single integer T ($0 < T \leq 100$) as the total number of the classes.

Then T lines follow. Each line contains 2 integers S_i and C_i ($0 \leq S_i \leq 100, 1 \leq C_i \leq 5$), representing a score and corresponding credit.

Input sample

```
1   2
2   95 3
3   87 5
```

Output

Print **1** number rounded to **2** position after the decimal point, representing the average GPA.

Output Sample

```
1  3.38
```

Hint 1

The average GPA calculation:

$$avg_{GPA} = \frac{\sum_{i=1}^{n} GPA_i \times C_i}{\sum_{i=1}^{n} C_i}$$

Hint 2

The **2** in the first line indicates that there are 2 classes.

The first score **95** is in the range of $90 \le score \le 100$, so the GPA value should be **4.0**.
The first score **87** is in the range of $80 \le score < 90$, so the GPA value should be **3.0**.

So, the average GPA is **3.38**.

Hint 3

You may use `System.out.printf("%.2f\n", num);` to print a floating point value round to 2 position after the decimal point.

Problem 3 Particle Movement

There is a pair of parallel metal plates in a vacuum. The potential difference between the two plates is U. If a particle with mass m and positive charge q starts to move through the parallel metal plates with the initial speed $v_0 = 0$ under the action of electrostatic force, please find out whether its speed reaches (not less than) the expected speed v_1 when passes through the parallel metal plates.
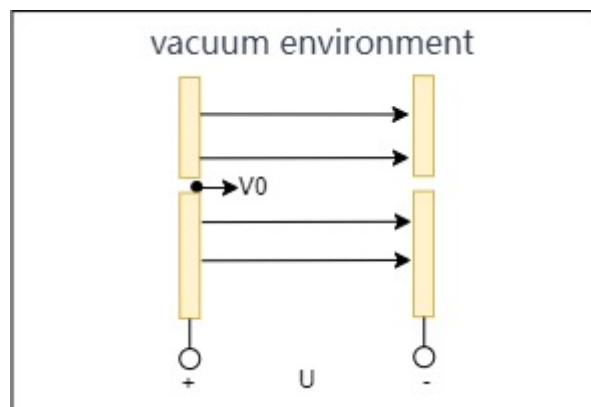
Input

The first line of input contains a single integer T ($0 < 100 < T$) as the number of *test cases*.

Then T lines follow. Each line contains 4 float numbers: v_1, m, q, U.

The v_1, m, q, U are guaranteed to be within the range $[0.01, 10]$.

Input sample

```
1  2
2  10 0.8 0.1 1
3  1 0.01 1 5
```

Output

Print `true` or `false` to represent whether the particle's speed reaches (not less than) the expected speed v_1 after passing through the parallel metal plates.

Output Sample

```
1  false
2  true
```

Hint

When a particle with initial velocity v_0 passes through a pair of parallel metal plates in a vacuum, where the potential difference between the two plates is U. The particle's velocity v_1 is:

$$\frac{1}{2}mv_1^2 - \frac{1}{2}mv_0^2 = qU$$

In our problem, the initial velocity v_0 is fixed to **0**.

Problem 4 Draw ball problem

You are drawing balls for T times from a black box containing $m = 1000$ black balls and $n = 1000$ white balls.
Only one ball can be drawn per time and will not be put back. The drawing history in the past $T - 1$ times is given. You are expected to provide the probability of drawing a white ball in the Tth drawing.

Input

The first line of input contains a single integer T ($0 < T < 1000$) as the number of draw times.

Then $T - 1$ lines follow, recording the color of the drawn ball in the past $T - 1$ times. Each line contains 1 number: **1** or **0**.

- 1 means black ball
- 0 means white ball

Input sample

```
1  4
2  1
3  1
4  0
```

Output

Print the probability of drawing a white ball for the Tth time in float form, with a precision of up to **2** decimal places.

Output Sample

```
1  0.50
```

Hint 1

In our problem, the initial counts of black balls and white balls are fixed $m = n = 1000$.

Hint 2

You may use `System.out.printf("%.2f\n", num);` to print a floating point value round to 2 positions after the decimal point.