Lab Assignment 1 CS109 2025Spring

Problem 1. Treasure Map (10 pts)

Qi has obtained a treasure map. The map marks a total of 10 locations, numbered `0, 1, 2, 3, 4, 5, 6, 7, 8, 9`, but only one of these locations is the true treasure site. He needs to follow the map's hints to find the treasure location.

Input Format

The input consists of several lines.

The first line is a positive integer n ($1 \leq n \leq 1000$), indicating the number of test cases.

The next n lines are the test cases.

Each test case occupies one line, and each test case is a positive integer m, representing the hint for the treasure location.

Output Format

For each test case, output an integer num, representing the true treasure's number.

The number is the last digit of the integer m.

Then output a newline character.

After that, output the result for the next test case.

Samples

Sample 1

Input

```
2
99
1000
```

output

```
9
0
```

Explanation

The first line is 2, indicating there are 2 test cases.

The first test case is 99, and its last digit is 9, so the output is 9.

Then output a newline character.

The second test case is 1000, and its last digit is 0, so the output is 0.

Problem 2. Treasure Password (20 pts)

Qi has arrived at the treasure site, but the treasure is hidden in a secret cave. The cave entrance has a mechanism that only opens when the correct password is entered. The password consists of 3 digits, and the order of the digits needs to be determined based on the hints.

Input Format

The input consists of 2 lines.

The first line is a positive integer n ($100 \leq n \leq 999$), representing the 3 digits used to form the password.

The second line is a positive integer m, which can be either 0 or 1.

If m is 0, it means the digits in the password should be arranged in descending order; if m is 1, it means the digits should be arranged in ascending order.

Output Format

Output a 3-digit integer num, representing the password.

Samples

Sample 1

Input

```
396
0
```

output

```
963
```

Explanation

The three digits are 3, 9, 6. The second line is 0, indicating that the digits should be arranged in descending order, so the password is 963.

Sample 2

Input

```
396
1
```

output

```
369
```

Explanation

The three digits are 3, 9, 6. The second line is 1, indicating that the digits should be arranged in ascending order, so the password is 369.

Sample 3

Input

```
505
1
```

output

```
055
```

Problem 3. Treasure Box (40 pts)

Qi successfully opened the cave and found a pile of boxes inside. Each box has an unique number, and the numbers of boxes are consecutive integers.

There is a hint next to the boxes: only the box with number that is **perfect number** contains treasure.

Perfect Number refers to a positive integer that is equal to the sum of all its **proper divisors** (i.e., divisors excluding itself). For example, 6 is a perfect number because its proper divisors are `1, 2, 3`, and `1 + 2 + 3 = 6`.

Please help Qi find which box contains the treasure.

Input Format

The input consists of only one line.

This line contains two positive integers l and r, representing the smallest and largest numbers on the boxes, respectively. The two integers are separated by a space.

Output Format

For each test case, output an integer num, representing the number of the box that contains the treasure.

If no box contains treasure, output `-1`.

In each test case, we guarantee that there will be no more than one perfect number.

Samples

Sample 1

Input

```
1 10
```

output

```
6
```

Explanation

In the range $[1, 10]$, there is one perfect number, 6, so the output is 6.

Sample 2

Input

```
1 2
```

output

```
-1
```

Explanation

In the range $[1, 2]$, there are no perfect numbers, so the output is -1.

Problem 4. Finding the Exit (30 pts)

Qi successfully opened the treasure box, but inside the box was a mysterious note that read:

> "To safely leave the cave, you need to solve the mystery of the cave exit's temperature~~"

The cave has several exits, each with a different temperature. Qi needs to find the exit with the temperature closest to the target temperature to leave safely.

The temperature units of each exit vary: **Celsius (摄氏度)**, **Fahrenheit (华氏度)**, and **Kelvin (开尔文)**.

Please help Qi quickly convert the temperatures and leave the cave safely.

Conversion Formulas

1. **Celsius to Fahrenheit**:

   $F = C \times 9/5 + 32$
2. **Fahrenheit to Celsius**:

   $C = (F - 32) \times 5/9$
3. **Celsius to Kelvin**:

   $K = C + 273.15$
4. **Kelvin to Celsius**:

   $C = K - 273.15$

Input Format

The target temperature and each exit's temperature are represented in the following format: **unit value**. (There is a space between unit and value)

Unit can be one of 3 types: `C, F, K`, where `C` represents Celsius, `F` represents Fahrenheit, and `K` represents Kelvin.

For example, `C 30` represents 30 degrees Celsius.

The input consists of several lines.

The first line is the target temperature.

The second line is a positive integer n, representing the number of exits.

The next n lines are the temperatures of the n exits. Each exit's temperature occupies one line.

Output Format

Output a positive integer, representing the number of the exit that can be used to safely leave the cave.

Note: Exit numbers start from 1 and increase by 1.

Samples

Sample 1

Input

```
C 30
3
K 100
C 100
F 100
```

output

```
3
```

Explanation

The target temperature is 30 degrees Celsius.

Convert the temperature of exit 1 from Kelvin to Celsius, which is -173.15 degrees Celsius, differing from the target temperature by 203.15 degrees Celsius.

The temperature of exit 2 is 100 degrees Celsius, differing from the target temperature by 70 degrees Celsius.

Convert the temperature of exit 3 from Fahrenheit to Celsius, which is approximately 37.78 degrees Celsius, differing from the target temperature by 7.78 degrees Celsius.

Exit 3 is the closest to the target temperature, so the output is 3.