Problemset

DIU Take Off Programming Contest,

Spring 2018

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A. Jingalala's Google Interview

Time Limit: 1.0 second **Memory Limit:** 32 MB

After working hard for a few years and participating in different contests, 'MI Jingalala' has finally been called for a **Google Interview**after placing 1st in **Google CodeJam 2020 Programming Contest** and currently working at Google's HQ.

You're also trying to become one of the best problem solvers of Bangladesh and then join Google. You must be wondering how they'd choose the most special ones from all other applicants. The answer is, **By observing how you solve a problem**.

As 'MI Jingalala' has come to Dhaka recently, he wants to take a test of DIU students. Here is the first problem he has given:-

Find and print the count of `a` in the quoted passage below:-

"`Competitive programming is a mind sport usually held over the Internet or a local network, involving participants trying to program according to provided specifications. Contestants are referred to as sports programmers. Competitive programming is recognized and supported by several multinational software and Internet companies, such as Google, and Facebook. There are several organizations who host programming competitions on a regular basis.`"

Let me tell you a secret, while most of the contestants will just count the number of a's in the above passage by hand, the smarter ones will simply count them by writing a code giving the passage as input and then submit the count as it's more precise and faster thing to do **;)**

Input details

You don't have to take any input for this problem, just output the answer.

Output details

Print a single integer that contains the answer. For example, a passage with "aarriba" will result/output 3(it's not the answer of the actual problem, it's just an example).

Note: Don't forget to put a "`new line`" at the end of output!

Problem setter: Mahmud Sajjad Abeer

B. Ghumkature Contestant

Time Limit: 1 second **Memory Limit:** 32 MB

DIU ACM arranges a weekly contest every Friday at 10:00 AM. As this is an onsite contest, all the contestants must be present at the contest venue in CSE building of Main Campus, DIU. Isn't that hard to wake up before 12:00 PM on the off days? Yeah, especially for those who sleep for hours worrying about nothing. Just like Sharin, she is one of the laziest contestants of DIU. No matter when she wakes up, she just wishes if she could sleep a little more.

Every Friday morning she calls Mehedi and asks if it's possible for her to participate the contest before it starts. Can you imagine? She can't even check the time by herself :-| **After receiving the call, Mehedi checks the time(in minutes) left to start the contest and suggests Sharin if she can go to the varsity within time.** Even though the matter is annoying for Mehedi, he needs to reply Sharin as she is his best friend. If Sharin can't reach **before the contest**, she'd rather sleep few more hours than participating late.

You are the best programmer of DIU. Mehedi came for your help. Given the time left for contest, you've to make a program that replies "**Varsity Jao**"(without quotes) if she can reach the contest **before it starts** or "**Ghumao**"(without quotes) if she can't. **Sharin takes exactly `71` minutes to get ready and reach the contest. So, she must have more than `71` minutes in hand to participate.**

Input details

There will be only one integer `X`. Here, `X` represents how much time(In minute) left for the contest to start and **remember Sharin always needs 71 minutes to get ready and reach the contest venue**. The given value of `X` will be a single integer in range `1` to `100`.

Output details

You have to print "`Varsity Jao`"(without quotes) if she can reach the contest, else print "`Ghumao`"(without quotes).

Sample Input	Sample Output
69	Ghumao
73	Varsity Jao

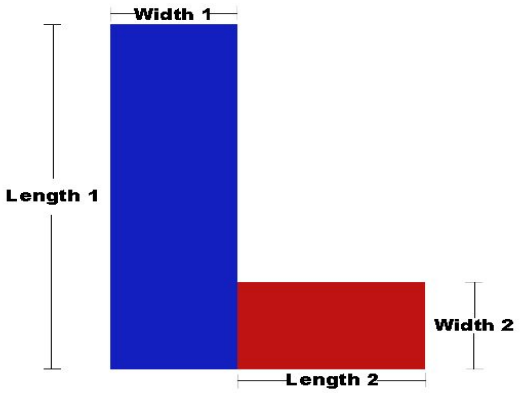
Note: **Don't forget the "`new line`" at the end of output and `spaces` between words!**

Problem setter: Mehedi Hasan Shesher

C. DIU and Habibi's new craze

Time Limit: 1 second **Memory Limit:** 32 MB

Mehedi has just admitted to DIU. His university has a big campus. Teacher of Mehedi, Mr. Habibi gave him a special task that was assigned to him by Mr. PC Khan and Habibi is so excited about this task. That is, **he has to determine the total area of a building of the university**. The building consists of **two rectangular** shape lands. Mr. Habibi will give Mehedi the `Length` and `Width` of both lands. Now the problem is, Mehedi doesn't know how to calculate the area and he is afraid that Habibi will be mad at him if he can't. Well, these are nothing new to some of us.



However, now it's your turn, help Mehedi to calculate the total area of his university. That is, **You have to write a program that will read length and width of two lands and print the total area**.

Input details

There will be 2 lines. Each containing two integers `L` and `W` where `L` and `W` will be between `1` to `100`

Here, `L` = length of a building and `W` = width of a building. You'll be given two of them.

Output details

The output will have only **one integer** containing **the total area of the university which is, the sum of two areas of those two rectangles.**

Sample Input	Sample Output
3 2 5 3	21
4 2 10 3	38

Problem setter: Md. Ferdous Ahmed Foysal

D. Princess mAina (ময়না) and her boyfriends

Time Limit: 0.5 seconds **Memory Limit:** 6800 MB

Princess mAina is a superstar in her country. Just like every other superstar out there, there are many boys crushed on her. And also she maintains a large number of boyfriends. Every day she manages to go out with all of them. **The more favorite the boyfriend is, the more time she passes with him**. Now, given the number of people crushed on her, the number of her boyfriends and how much time she passes with each of the boyfriends, **you've to tell us which one's her most favorite boyfriend**.

Input details

The input starts with two numbers `C(1<=C<=100000)` and `B(1<=B<=100000)`, where `C` represents the number of boys crushed on her and `B` represents the number of boyfriends she possesses.

Next line will contain `B` **distinct** integers `T1, T2, ..., TB`, each of which denotes the time she passes with `i`th boyfriend. i.e The second integer denotes the time she passes with her second boyfriend.

Output details

For each input, print the **index number** of the most favourite boyfriend of Princess mAina. For example, If 3rd boyfriend is the most favourite one just print “3” without quotes. **Indexing starts from 1.**

Sample Input	Sample Output
5 7 2 4 9 1 17 11 3	5
3 3 2 3 5	3

Problem setter: Muhaiminul Islam Jim

E. Power of Two

Time Limit: 1 second **Memory Limit:** 32 MB

In real life, we write $(1000000000)_{10} = 10^9$, $(100000000)_{10} = 10^8$ and $(10000000)_{10}$ as 10^7. Also in binary or 2 base number we can write $(10)_2 = 2^1$, $(100)_2 = 2^2$, $2^3 = (1000)_2$, $(10000)_2 = 2^4$.

Now, given n and you have to output the binary number where $2^n = (?)_2$.

For example, if n = 3, $2^3 = (8)_{10} = (1000)_2$, so output will be 1000. (See sample input output for more details.)

Input details

The first line consists of a number $T\ (\ 0 < T \leq 100)$, then next T line consist of a number $n\ (\ 0 < n \leq 1000)$. (See sample input)

Output details

For each n output a single line, the binary value of 2^n. (See sample output).

Sample Input	Sample Output
5 1 8 3 6 10	10 100000000 1000 1000000 10000000000

Note: **A binary number can only contain 0s or 1s in it's digits.**

Problem setter: Pranto Das
Alternate writer: Nesar Ahammed Jony

F. Big Bang Theory

Time Limit: 3 seconds **Memory Limit:** 2510 MB

The Big Bang theory is the prevailing cosmological model for the universe. It says that, the universe expanded from a very high-density and high-temperature state.

You're currently working at NASA as a programmer. Now, using graphics they want you to visualize a part of galaxy at `Pth` moment after Big Bang happened. For simplicity, the part of galaxy is defined as a `N x M` 2D grid filled with `0`s **where there can be at best one BigBang point `1` meaning that the Big Bang will start from there**. Now the expanding rule is, **at the increase of every moment each 1 will expand to 4 cells(up, down, right, left)**. For example, if the `1` is on `i`th row and `j`th cell, then it will expand to `(i+1, j)`, `(i-1, j)`, `(i, j+1)` and `(i, j-1)` th cells.

You'll be given a `N x M` grid with at most **one BigBang point**. Write a program that will output the given part of galaxy's view at `Pth`moment.

Input details

The first line of the input will contain an integer `T (1<=T<=400)` denoting the number of test cases. Then on each test cases, the first line will contain 3 integers `N`, `M` and `P (1<=N, M, P<=20)` where `N` = number of rows, `M` = number of columns, `P` = moment. Then there will be `N` rows containing `M` integers where each integer is either `0` or `1` where `1` is the only BigBangPoint. **There will be at most one 1**.

Output details

For each case you have to output "`Case #X:`" (without quotes) at the first line where `X` is the case number starting from `1`.

Then for each test case, there will be `N` rows with `M` columns (separated by a single space with no trailing space) containing **ones or zeros** at `Pth` moment. See the samples for better understanding.

Sample Input

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

Sample Output

```
Case #1:
0 1 0
1 1 1
0 1 0
Case #2:
0 0 1
0 1 1
1 1 1
```

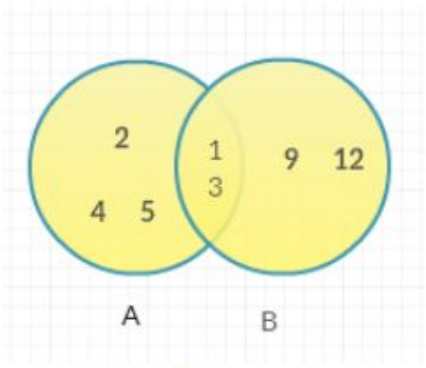
Note: **Be careful about the output format.**

Problem setter: Mahmud Sajjad Abeer
Alternate writer: Nesar Ahammed Jony

G. Olympiad

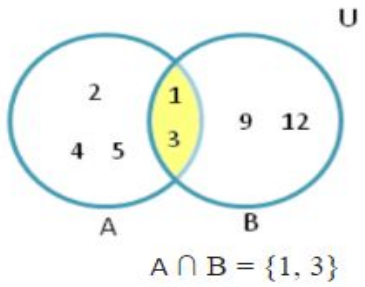
Time Limit: 2 seconds **Memory Limit:** 500 MB

Alice is a High school student. He heard about IMO (International Mathematical Olympiad) few days ago from his math teacher in school. After that, he started the preparation for this Olympiad by studying a lot of maths, read different math textbooks, articles and so on. Oneday, he was learning a new topic called SET. And he didn't understand many parts of this topic. Then he made an appointment with his math teacher and simply understood everything from teacher. Especially "What is SET ?" and Intersection and Union between two sets. That is, **A set is a group or collection of unique objects or numbers** And **Given two sets A and B, the union is the new set that contains elements that belong to either A or to B or to both**. Union is represented by U. **And for sets A and B, the intersection is the set that contains elements that belong to A and to B at the same time**. Intersection is Represented By ∩.
For example,



A U B = {1,2,3,4,5,9,12}

Given two sets A and B, Where, A = {1,2,3,4,5} and B = {1,3,9,12}



A ∩ B = {1, 3}

Alice's teacher has given him a homework. Alice came to you for help. **Now, you have to write a program that reads two sets of number and a command and prints Union or Intersection of these two sets depending on the given operation**.

Input details

The first line will contain an integer `T ( 1 <= T <= 100 )` denoting the number of test cases. Then on each test case you will be given Two space separated Integer `N ( 1 <= N <= 100 )` and `M ( 1 <= M <= 100 )` and a character `C`. `N` and `M` represents the number of elements of SET-A and SET-B and `C` is the operation command. **Command is 'U'(without single quote) for Union and 'I' for Intersection**. The second line contains `N (1 ≤ N ≤ 100)` space-separated integers `a1, a2, ..., an (1 ≤ ai ≤ 100)` -- The Element of Set-A. Every Element is unique. That is every element is different from one another. And The third Line Contains `M (1 ≤ M ≤ 100)` space-separated integers `b1, b2, ..., bm (1 ≤ bi ≤ 100)` -- The Element of SET- B. **And also Every Element is unique. Both of Set-A and Set-B have at-least one common elements**.

Output details

For each test case print `"Case #X:"`. Where `x` is the running test case number. Then print the `Union` of two sets if Command is `'U'` and print `intersection` if Command is `'I'`.print answer in ascending order Check Sample input output for more details.

Sample Input	Sample Output
2	Case #1: 1 2 4 5 6 7

4 3 U
1 4 6 7
2 4 5

5 2 I
1 2 3 4 5
2 3

Case #2: 2 3

Problem setter: Nesar Ahammed Jony
Alternate writer: Pranto Das

H. What does it even mean?

Time Limit: 2 seconds **Memory Limit:**512 MB

You know Baymex right? The chubby fluffy inflated robot from Big Hero 6. While searching through online scripts Baymex has gathered some text which has **no space**. It might be easier for a human to understand though, but Baymex is lost. **He needs the texts to be broken into proper words.** Now you, a great programmer, came to his rescue. To simplify the problem here is how to get the words from the sentence. You will be given a set of `d` words as your defined dictionary. Then you will be given `q` strings **which you will have to split into proper words. Now there are many words which have same starting but different length. You are to take the bigger one for this problem.**

Input details

Each test case will start with two integers `d` and `q (1 <= q <= d <= 10000)`. The following `d` lines will contain `d` words of the dictionary. After that the following `q` lines will contain one string each without spaces. Size of query string shall not exceed 1000 character. **Input will be finished by EOF.**

Output details

You will have to print the words from the strings as shown in the sample output.

Sample Input

```
5 1
boring
life
getting
better
today
boringlifegettingbettertoday
6 1
better
be
good
going
gone
boy
betterbegoodgoinggoneboy
```

Sample Output

```
boring
life
getting
better
today
better
be
good
going
gone
boy
```

Note: **For input `intothere` your output should be `into`, `there` not `in`, `to`, `the`, `re`.**

Problem setter: Mehedi Imam Shafi
Alternate writer: Muhaiminul Islam Jim, Nesar Ahammed Jony

I. Hardest Problem Ever!!! (Click bait)

Time Limit: 1 second **Memory Limit:** 32 MB

Life has never been so easy. Rather it's easier to accept the hardship of life and moving on so that you get used to it and life seems easier.

Like everyone, you also have a dream to fulfill. Whatever it is, in most of the cases we forget that success is not given, it's earned through hard work and persistence. If you want to reach there so bad and make it done whatever it takes then you must go through some hard times when you must keep working and be patient to reach the ultimate goal. You know, **"Great things take time"** and you must **Never Give Up** until you succeed.

As you've started programming recently and your dream is to be the next icon in the programming world, here's an easy task for you:-

Just print "`Great things take time`"(without quotes) or just write the following code exactly and submit:-

```
int main()
{
    printf("Great things take time\n");
    return 0;
}
```

Input details

There is no input in this problem. Only write the code exactly and submit.

Output details

Output **"Great things take time"**(Without Quotes).

Sample Input	Sample Output
/* There is no input for this problem */	Great things take time

Note: **Don't forget "`new line`" at the end of output and `spaces` between words!**

Problem setter: Mahmud Sajjad Abeer