

Intra AUST Programming Contest
Fall-2014
Problem Set

A. Basic Multiplication

Time Limit – 1 seconds

Let's back to primary multiplication. In this problem you have to print the steps of multiplication.

Input:

Input starts with an integer T (≤ 100), denoting the number of test cases.

Each case starts with two integer numbers **A**, **B**. Both A and B are non-negative integer number. Both A and B can have maximum of 4 digit and $B \leq A$.

Output:

For each case, print the first number, then second number. Then .
Print a blank line after each case.

Sample Input	Sample Output
3	10
10 10	10
111 11	---
2000 9	0
	10

	100
	111
	11

	111
	111

	1221
	2000
	9

	18000

Explanation:

10 *10

First $10 * 0 = 00$ but you will not print any leading zero so print is as only 0.

Second $10 * 1 = 10$ there will be no trailing spaces. Just print 10.

In first test case the spaces are shown as ‘ ’

.10

.10

..0

10

100

B. Mix It

Time Limit – 1 seconds

Chrissy likes mixing audio tracks to make CD. She is going to go on a holiday soon. So she has decided to quickly collect songs to make n CDs. She has already used some minutes of her CDs. CD no. i ($1 \leq i \leq n$) can contain K_i minutes of song. And has D_i minutes left free to be filled. Now she has m tracks left. The length of the j -th song is ($1 \leq j \leq m$) P_j minutes. She wants to use those songs in the free spaces of the CDs to keep the total used minutes of all CDs maximum.

She can take a single song for several CDs. **BUT** at most **one** song can be added in a CD. And songs can be kept unused too.

Now Chrissy is cool and all but not good in calculation. So she wants your help in optimizing the solution so that she can make the total length of all CDs as large as possible. It will be super lame if you don't help Chrissy. Who knows she might dedicate her next cover to those solving the problem.

Input :

The first line contains n ($1 \leq n \leq 100$) and m ($1 \leq m \leq 100$).

Each of the next n line contains two integers. K ($1 \leq K \leq 100$) and D ($0 \leq D \leq M$), describing the total and free space of a CD.

The next line contains m integers. The i -th integer is the length of the i -th songs.

Output:

The possible maximum total length.

Sample Input	Sample Output
1 4 6 10 2 12 1 13 4 15 10 9 13 4 1 14 5	48

Explanation: In the given sample case:

Song 4 is used in CD 1. Song 4 is used in CD 2. Song 3 is used in CD 3. Song 1 is used in CD 4. This results in total minute of $(9 + 12 + 13 + 14) = 48$.

C. Drawings Lines

Time Limit – 1 seconds

Mr. X teaches in a school. One day in class he found a 1D segment which is n length long. There are m in the class. He will take an exam using this segment.

He calls them to draw a line in that segment. Every student draw a line from X_i to Y_i ($1 \leq i \leq m$).

Now he will ask them q question. Each question he tells them a point X & asks them how many lines are on that point.

Input :

First line contain test case T ($T \leq 10$).

Second line n ($2 \leq n \leq 100000$) & m ($1 \leq m \leq 1000$).

Next m lines X_i & Y_i ($1 \leq i \leq m$, $1 \leq X_i < Y_i$, $1 < Y_i \leq n$)

Next line Query q ($1 \leq q \leq 10000$).

Next q line contains a point X ($1 \leq X \leq n$).

Output:

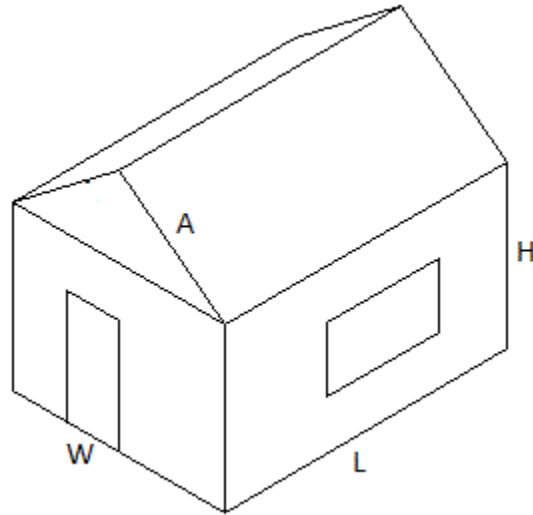
For each test case print the case number then for each question print how many lines are on that point.

Sample Input	Sample Output
2	Case 1:
5 2	1
1 2	0
3 4	Case 2:
2	2
1	
5	
5 2	
1 2	
2 4	
1	
2	

D. Mr. X & store room

Time Limit – 1 seconds

Mr. X wants to open a shop. He has a store room where he will store his grocers. Now he wants to store as many grocers as possible. So he wants to know the **volume** of the store room. He is not good at mathematics, so he needs your help. He will provide you some measurement of the store room.



Input :

The first line contains test case T($T \leq 1000$).

Next line contains four integers **L,W,H,A**.

$1 \leq L, W, H, A \leq 100000$

Output:

Output volume of this up to 4 digit after decimal point. (use %.4lf to print the result)

Sample Input	Sample Output
1 25 18 5 14	4662.8562

E. Perfect Match

Time Limit – 4 seconds

Given a sequence **S** of length **n**, consists of only '(' and ')'. Your task is to find number of different sub-sequences of **S** that are regular bracket sequences. For example, the sequence "((()O)()" has 8 such subsequences: "((()O)()", "(()O)", "((()O)", "(()O)", "()", "OO", "O", and "".

Input

Input starts with an integer **T** (**< 101**), denoting the number of test cases. Each test case contains an integer **n** (**0 < n < 1001**) and followed by a sequence **S** of '(' and ')'. **S** doesn't contain any white space.

Output

For each case, print the case number and the answer modulo **1000000007**.

Sample Input	Sample Output
1 9 ((()O)()	Case 1: 8

F. Sum It up

Time Limit – 1 seconds

Let $S(n)$ be the number of expressions for n as a sum of positive odd integers. For example,

$$4 = 3 + 1$$

$$= 1 + 3$$

$$= 1 + 1 + 1$$

so $S(4) = 3$.

Input

Input starts with an integer T (< 101), denoting the number of test cases. Each line contains a single non-negative integer n .

Output

For each case, print the case number and the value of $S(n)$ module 1000000007 .

Sample Input	Sample Output
3 1 4 100	Case 1: 1 Case 2: 3 Case 3: 687995182

G. Super Boy And ASUNA

Time Limit – 1 second

Super Boy is madly in love with ASUNA. All day and night, he only thinks about her and so can't find enough time to solve problems. Super Boy is a friend of Sherlock Holmes. One day Sherlock Holmes finds out that ASUNA is cheating behind him and she is dating with an Alphabet House's Boy. So he immediately informs Super Boy about it. It's a tradition that Alphabet House's boys can only date with Prime House's Girls (and ASUNA is a Prime House's Girl!!). Whatever, when Super Boy asked Alphabet House's boys, everyone denied about dating with ASUNA. But, Super Boy's friend, Sherlock Holmes, can never be wrong and one of them must be lying. So Super Boy asked them to write down the name of the girls they are dating. But, alas, they all wrote the code name of their girls!! Every Prime House's Girl has a code name, which is a prime number. Also every prime number belongs to a Prime House's Girl. Super Boy knows that the culprit didn't lie about any other Prime House's Girl being his girlfriend, because if he did that, he would be cursed forever. Super Boy is a very good programmer but this time he can't keep his head cool and find out who is the culprit. Can you help our Super Boy?

A says "I am dating with 5915587277".

B says "I am dating with 1500450271".

C says "I am dating with 3267000013".

D says "I am dating with 5754853343".

E says "I am dating with 4093082899".

F says "I am dating with 9576890767".

G says "I am dating with 3628273133".

H says "I am dating with 2860486313".

I says "I am dating with 5463458053".

J says "I am dating with 3367900313".

K says "I am dating with 10000169".

L says "I am dating with 10000223".

M says "I am dating with 10000931".

N says "I am dating with 10006721".

O says "I am dating with 10010101".

P says "I am dating with 70116723".

Q says "I am dating with 77777377".

R says "I am dating with 77777177".

S says "I am dating with 77532523".

T says "I am dating with 77345993".

U says "I am dating with 76695841".

V says "I am dating with 76540231".

W says "I am dating with 75372313".

X says "I am dating with 75372133".

Y says "I am dating with 73939133".

Z says "I am dating with 73176001".

There is no input for this Problem. You just have to print the culprit's name. If "A" is the culprit then just print "A" (without quote, i.e. `printf("A\n")`).

H. Trap Game

Time Limit – 1 seconds

Alice and Bob are your students. One day, you told them to write down an integer between 1 and **k**. Alice wrote **a** and Bob wrote **b**. But they don't want to show their numbers. Instead, they want you to guess if the numbers have any common divisor greater than 1. If your answer is "YES", then what is the probability that you've answered correctly.

Input

Input starts with an integer **T** (**< 21**), denoting the number of test cases. Each test case contains an integer **k** (**0 < k < 1001**).

Output

Output the expected probability of this up to 4 digit after decimal point. (use %.4lf to print the result)

Sample Input	Sample Output
2	0.0000
1	0.2500
2	

I. Check Mate

Time Limit – 1 seconds

I am quite sure all of you are quite familiar with Chess. Suppose, you are given a shape of the board (not the traditional chess board) and you need to place rooks in the board. Any two pieces of rook cannot be placed in any of the board in the same row or same column. You need write a program to solve a given shape and size of the board, placing exactly K rooks in all possible placements in the grid.

NB: You can only place rooks in any of the (*) marked position.

Input :

Input starts with an integer T (≤ 50), denoting the number of test cases.

Each case starts with two integer numbers N, K representing the size of the board is N*N and K rooks need to be placed. Then N lines describe the shape of the board: N characters per line, where (*) represents the board area where you can place a rook. ($1 \leq N \leq 8$ and $K \leq N$)

Output:

For each case, print the case number followed by number of ways you can put K rook in the board.

See the sample I/O.

Sample Input	Sample Output
3 2 1 *. .* 4 4 ...* ..*. .*.. *.. 3 2 *** *** ***	Case 1: 2 Case 2: 1 Case 3: 18