华南理工大学软件文化节

“三七互娱杯”程序设计竞赛

在比赛开始之前，请不要翻阅题册

所有题目均使用 standard input 和 standard output

所有题目的内存限制都是 256MB

所有题目的时间限制请在题目页面查看

Problem A
HRY and sign-in Problem

Time Limit: 1 second

Description

Another annual school competition is held today. HRY finally turned from a contestant to a (duliu) problem maker. First of all, this question is a simple sign-in question. Why? Because you only need to output the following 9-line code to get an Accepted!

```
#include <stdio.h>
int main(){
    double world;
    unsigned letter;
    short stay;
    long memories;
    printf("AreUOK?\n");
    return 0;
}
```

Input

There's no input for this problem.

Output

Output the code, and **please do not output the line number**.
Four spaces form a tab, and there are no trailing spaces in every line.

Sample Input

Sample Output

```
#include <stdio.h>
int main(){
    double world;
    unsigned letter;
    short stay;
    long memories;
    printf("AreUOK?\n");
    return 0;
}
```

Problem B
HRY and codefire

Time Limit: 1 second

Description

As is all known, yang12138 is a pupil. He registered two accounts on codefire. The two accounts are both at level 0 initially, and the level is at most n. Every time he wins, the level will increase by 1, but if he loses, the level will not change. When using an account at level i, the winning probability of yang12138 is p_i.

Someone who reaches level n is called a GrandMaster in codefire. yang12138 has a dream of being a GrandMaster, so he is trying hard. His strategy is as follows:

1. Randomly pick an account to take part in a competition at first.

2. Assume that he is currently using account A, if he wins, he continues using account A to take part in competitions. Otherwise he will use the other account.

3. When any of his account reaches level n, stop immediately, because yang12138 has become yang12138 .

Given probability of winning of yang12138 at each level. As a GrandMaster, please calculate the expected competition times of yang12138 to become a GrandMaster.

Input

The first line of input contains an integer T, indicating the number of test cases.
For each test case there are two lines :
The first line contains an integer n.
The second line contains n real numbers $p_i (0 \leq i \leq n-1, 0 < p_i < 1)$, indicating the probability of winning when using an account at level i.
$1 \leq T \leq 20, 1 \leq n \leq 300$.

Output

For each test case output a real number, rounded to 4 decimal places.

Sample Input

2
1
0.5
2
0.5 0.5

Sample Output

2.0000
4.6667

Problem C
HRY and fibonacci

Time Limit: 5 seconds

Description

HRY is a pupil. He has just learned about Fibonacci sequence recently, and he made some new sequences :

$$fic(n) = \sum_{i=1}^{n} fib(i)$$

$$fid(n) = \sum_{i=1}^{n} fic(i)$$

$fib(i)$ means the ith element in the Fibonacci sequence :

$$fib(1) = fib(2) = 1, fib(i) = fib(i-1) + fib(i-2), i \geq 3$$

At first this problem is to calculate $fid(n)$, but that is too easy. So after discussing with 10256, they changed the problem:

Given a positive integer array $a_1, a_2, ..., a_n$, perform the following two types of operations:

1. Given l, r, x, for all $l \leq i \leq r$, execute $a_i = a_i + x$.
2. Given l, r, calculate $\left(\sum_{i=l}^{r} fid(a_i) \right) \%100000007$.

Input

The first line of the input contains an integer n, indicating the length of the array.
The second line contains n positive integers separated by spaces, indicating $a_1, a_2, ..., a_{n-1}, a_n$.
The third line contains an integer Q, indicating the number of operations.
For the next Q lines, it is either "1 l r x", indicating the first type of operation, or "2 l r", indicating the second type of operation.
All values in input are integers.
$1 \leq n, Q \leq 100000, 1 \leq a_i, x \leq 10^9, 1 \leq l \leq r \leq n$.

Output

For each operation of second type, output $\left(\sum_{i=l}^{r} fid(a_i)\right)\%100000007$.

Sample Input

```
3
1 2 3
6
2 1 3
1 1 3 1
2 1 3
1 1 1 2
1 2 2 3
2 1 3
```

Sample Output

```
11
24
74
```

Problem D
HRY and Abbas

Time Limit: 1 second

Description

In a parallel universe, HRY is the president of the Kassel Academy Student Union. Once he and the Lionheart Association President Abdullah Abbas performed a secret mission: to investigate the mixed blood drug trafficking group in country X.
However, an accident happened and they were caught together. They were forced to play Russian gambling roulette games!
The terrorists brought a revolver which works as follows: a revolver has n places $1, 2, ..., n$ to place bullet, and these n places forms a circle. The revolver has a position it is currently pointing at, and when pulling the trigger, the revolver will shoot out the bullet (if it has) at the current position and turn to the next position. The next position of $1 \leq i \leq n-1$ is $i+1$, and for n the next position is 1. Now the terrorist puts m bullets in the revolver, and turned the wheel of the revolver, which means the starting position is randomly chosen. He orders HRY and Abbas shoot at their heads in turn using the same revolver. If someone is hit by bullet, then the game is over.
HRY and Abbas are both not ordinary mixed blood, so the revolver can do no harm to them. However, they still decided to play the game. Now they want to know the probability of the game ending **exactly** after the ith shoot.

Input

The first line is an integer T, indicating the number of test cases.
For each test case there are two lines :
The first line contains two integers n, m, and the second line contains m different positive integers a_i, indicating the initial positions of bullets.
$1 \leq T \leq 1000, 1 \leq m \leq n \leq 10^5, 1 \leq a_i \leq n$.
The sum of n does not exceed 10^6.

Output

For each test case output n lines, the ith line indicates the probability of game ending **exactly** after the ith shoot. The probability is in the form of irreducible fraction p/q, which means the greatest common divisor of p and q is 1. If the answer is 0, output 0 directly.

Sample Input

```
2
10 2
1 3
10 4
1 2 6 10
```

Sample Output

```
1/5
1/5
1/10
1/10
1/10
1/10
1/10
1/10
0
0
2/5
1/5
1/5
1/5
0
0
0
0
0
0
```

Problem E
HRY and array

Time Limit: 1 second

Description

Given two arrays A, B with length n, perform the following operations in order:

1. Randomly shuffle array A
2. Randomly shuffle array B
3. Calculate $S = \sum_{i=1}^{n} A_i B_i$.

It is easy to know that there $n! \times n!$ possible combinations in total. Please calculate the expectation of S.

Input

The first line contains an integer T, indicating the number of test case.
For each test case there are three lines :
The first line is a positive integer n, indicating the length of array A, B.
The second line contains n non-negative integers, indicating array A.
The third line contains n non-negative integers, indicating array B.
$1 \leq T \leq 100, 1 \leq n \leq 10^5, 0 \leq A_i, B_i \leq 10000$.
It is guaranteed that the sum of n does not exceed 10^6.

Output

For each test case output a line of a real number, indicating the expectation of S, **rounded to** 30 **decimal places.**

Sample Input

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

Sample Output

```
3.000000000000000000000000000000
10.500000000000000000000000000000
```

Problem F
HRY and balls

Time Limit: 1 second

Description

When HRY was young, he like playing balls. The young boy was tidy, so on each ball he wrote a number i which means the ball belongs to box i. When playing balls, he put balls into these boxes randomly, but before bedtime, he will put them back to the boxes where they belong to.
As HRY is a little child, the way he put balls back is simple. Every time he chooses a box, pick out all the balls in the box, put every ball into the box it should be. Then he chooses another box, and repeat this operation until every ball is in the right box. The time he need for each box is the number of balls in this box now, and for any other operations the time is ignored.
As an expert of playing balls, HRY found that the order of choosing boxes greatly influenced the total time to put the balls back. But HRY is still too young, so he wants you, a JBer, to calculate how much time he needs at least to put the balls back.

Input

The first line contains an integer T, indicating the number of test cases.
For each test case the first line contains two integers n, m, indicating the number of balls and the number of boxes respectively.
Then follows n lines. The ith line contains two integers a_i and b_i, which means that ball i is currently in box a_i and should be put into box b_i.
$1 \leq T \leq 10000, 1 \leq n \leq 100000, 1 \leq m \leq 18, 1 \leq a_i, b_i \leq m$.
The sum of n does not exceed 10^6, and no more than 5 test cases has $m \geq 10$.

Output

For each test case output a line of a integer, indicating the least total time needed.

Sample Input

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

Sample Output

```
3
2
0
```

Problem G
HRY and ec-final

Time Limit: 1 second

Description

*yang*12138 participated in the ec-final of 8102. Though he was good at number theory, he did not succeed in solving one of the number theory problem. This made him feel very angry. After the contest, he came up with a more difficult (?) number theory problem. He was so mad that he took the problem to this contest. Can you solve it?
There is an integer sequence S(index from 1) of length 10^9, which is composed of :

$$\phi(1), \phi(2), ..., \phi(999999999), \phi(1000000000)$$

where $\phi(n)$ represents the Euler function of n.
The definition of the Euler function is given below:

$$\phi(n) = \textbf{Number of integers in } 1 - n \textbf{ which is coprime with n.}$$

The Euler function values of $1, 2, ..., 9, 10$ are $1, 1, 2, 2, 4, 2, 6, 4, 6, 4$

Given a sequence of numbers T(index from 1) with length of 300. He wants to know if this sequence is a contiguous subsequence of S. That is, whether there exists an i such that $T_1 = S_i, T_2 = S_{i+1}, ..., T_{299} = S_{i+298}, T_{300} = S_{i+299}$. If exists, output the smallest i, otherwise output "yang12138 laji"(without quotes).

Input

The input has 30 lines, ten positive integers per line, representing the sequence T.

Output

If the sequence T is a contiguous subsequence of S, output the smallest position i, otherwise output "yang12138 laji", without quotes.

Sample Input 1

```
1 1 2 2 4 2 6 4 6 4
10 4 12 6 8 8 16 6 18 8
12 10 22 8 20 12 18 12 28 8
30 16 20 16 24 12 36 18 24 16
40 12 42 20 24 22 46 16 42 20
32 24 52 18 40 24 36 28 58 16
60 30 36 32 48 20 66 32 44 24
70 24 72 36 40 36 60 24 78 32
54 40 82 24 64 42 56 40 88 24
72 44 60 46 72 32 96 42 60 40
100 32 102 48 48 52 106 36 108 40
72 48 112 36 88 56 72 58 96 32
110 60 80 60 100 36 126 64 84 48
130 40 108 66 72 64 136 44 138 48
92 70 120 48 112 72 84 72 148 40
150 72 96 60 120 48 156 78 104 64
132 54 162 80 80 82 166 48 156 64
108 84 172 56 120 80 116 88 178 48
180 72 120 88 144 60 160 92 108 72
190 64 192 96 96 84 196 60 198 80
132 100 168 64 160 102 132 96 180 48
210 104 140 106 168 72 180 108 144 80
192 72 222 96 120 112 226 72 228 88
120 112 232 72 184 116 156 96 238 64
240 110 162 120 168 80 216 120 164 100
250 72 220 126 128 128 256 84 216 96
168 130 262 80 208 108 176 132 268 72
270 128 144 136 200 88 276 138 180 96
280 92 282 140 144 120 240 96 272 112
192 144 292 84 232 144 180 148 264 80
```

Sample Output 1

```
1
```

Sample Input 2

1 1 2 2 4 2 6 4 6 4
10 4 12 6 8 8 16 6 18 8
12 10 22 8 20 12 18 12 28 8
30 16 20 16 24 12 36 18 24 16
40 12 42 20 24 22 46 16 42 20
32 24 52 18 40 24 36 28 58 16
60 30 36 32 48 20 66 32 44 24
70 24 72 36 40 36 60 24 78 32
54 40 82 24 64 42 56 40 88 24
72 44 60 46 72 32 96 42 60 40
100 32 102 48 48 52 106 36 108 40
72 48 112 36 88 55 72 58 96 32
110 60 80 60 100 36 126 64 84 48
130 40 108 66 72 64 136 44 138 48
92 70 120 48 112 72 84 72 148 40
150 72 96 60 120 48 156 78 104 64
132 54 162 80 80 82 166 48 156 64
108 84 172 56 120 80 116 88 178 48
180 72 120 88 144 60 160 92 108 72
190 64 192 96 96 84 196 60 198 80
132 100 168 64 160 102 132 96 180 48
210 104 140 106 168 72 180 108 144 80
192 72 222 96 120 112 226 72 228 88
120 112 232 72 184 116 156 96 238 64
240 110 162 120 168 80 216 120 164 100
250 72 220 126 128 128 256 84 216 96
168 130 262 80 208 108 176 132 268 72
270 128 144 136 200 88 276 138 180 96
280 92 282 140 144 120 240 96 272 112
192 144 292 84 232 144 180 148 264 80

Sample Output 2

yang12138 laji

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Problem H
HRY and tree

Time Limit: 2 seconds

Description

In 9102, HRY was elected as the director of the GDCPC Metro Bureau. In his work, he needs to use his knowledge to solve some problems.
The subway line of GDCPC can be regarded as a connected graph composed of n points and $n-1$ edges. The edge weight represents the distance between two points. The weight of the path between two different points is defined as the maximum value of the edge weights of all edges on the simple path between them. Now HRY needs to know the sum of the weights of all pairs of points (obviously there are C_n^2 kinds), because he is busy, so he wants you, a JBer, to helped him calculate it.

Input

The first line of the input file contains a positive integer T, indicating the number of test cases.
Each case has n lines. The first line is a positive integer n, indicating the number of points; the next $n-1$ lines each line contains three positive integers u, v, w, indicating that there is an edge between u and v, and the weight of this edge is w. It is guaranteed that the input forms a tree.
$1 \leq T \leq 100, 1 \leq n \leq 1000000, 1 \leq u, v \leq n, 1 \leq w \leq 2 * 10^7$.
The sum of n does not exceed 2000000.

Output

For each test case, output a line of a positive integer representing the sum of the weights of all paths.

Sample Input

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

Sample Output

```
5
14
```

Problem I
HRY and mobius

Time Limit: 7 seconds

Description

Some day in 8102, the young HRY just learned about mobius. He then made a new function:

$$f(n,k) = \sum_{i=1}^{n} \mu(i)^k$$

Given n and k, output $f(n,k)$.

Here $\mu(i)$ represents *mobius function*. Here we give the definition of mobius:

1. $\mu(1) = 1$.
2. If n has a square factor (there exist p^2 which divides n), $\mu(n) = 0$.
3. If n is the product of odd number of different prime numbers, $\mu(n) = -1$.
4. if n is the product of even number of different prime numbers, $\mu(n) = 1$.

The *mobius function* of $1, 2, .., 9, 10$ are $1, -1, -1, 0, -1, 1, -1, 0, 0, 1$ respectively.

In this problem we define $0^0 = 1$.

Input

The first line of input contains an integer T, indicating the number of test cases.
Each test case contains a line of two integers, respectively n, k.
$1 \leq T \leq 100, 1 \leq n \leq 10^{11}, 0 \leq k \leq 10^6$.
It is guaranteed that the sum of n does not exceed 10^{11}.

Output

For each test case output an integer, indicating $f(n,k)$.

Sample Input

```
3
10 0
10 1
10 2
```

Sample Output

```
10
-1
7
```

Problem J
HRY and Fight the landlord

Time Limit: 1 second

Description

In a parallel universe, HRY is a gambling expert. This time, he is playing Fight the Landlord with the *pumpkin*, 10256 at the table!

As everyone knows, when playing Fight the Landlord, HRY is sure to try to be the landlord. This time he also got the wish to be the landlord!

Whoa! He's got good luck!

After a few rounds, HRY has already played some cards (or maybe zero cards). Now it's HRY's turn again. He wants to know if he can play all the remaining cards he has in this round.

Rules of Fight the Landlord:

The deck consists of 54 cards. From small to large, the points are $3 < 4 < 5 < 6 < 7 < 8 < 9 < 10 < J < Q < K < A < 2 < W1 < W2$. For $W1$ and $W2$ there is only 1 card for each and for other points they have 4 cards for each. At the beginning, the landlord has 20 cards, and the two civilians have 17 cards. The landlord plays first.

The types of card that can be played in a round:

Single: Any single card can be used as a Single, such as J or W2.

Pair: Any two cards with the same point, such as 3 3 or Q Q. But W1 W2 is not a Pair.

Triple: Any three cards with the same point, such as 9 9 9.

Triple plus a Single: A "Triple" and a "Single". The points of the "Triple" and the "Single" must be different, such as 10 10 10 9.

Triple plus a Pair: A "Triple" and a "Pair", such as 7 7 7 K K.

Single Straight: Five or more consecutive "Singles", excluding 2, W1, W2. Such as 3 4 5 6 7 8 or 6 7 8 9 10 J Q K A.

Pair Straight: Three or more consecutive "Pairs", excluding 2, W1, W2. Such as 3 3 4 4 5 5 or 5 5 6 6 7 7 8 8.

Triple Straight: Two or more consecutive "Triples", excluding 2, W1, W2. Such as 4 4 4 5 5 5 or J J J Q Q Q K K K.

Airplane No. 1: Two or more consecutive "Triple plus a Single", excluding "Triple" 2 2 2. For example, 3 3 3 9 4 4 4 2 or K K K 10 A A A 10 are valid, but A A A 3 2 2 2 4 is not valid. "Consecutive" here means that the point of the "Triple" in each "Triple plus a Single" is consecutive.

Airplane No. 2: Two or more consecutive "Triple plus a Pair", excluding "Triple" 2 2 2. For example, J J J 2 2 Q Q Q 8 8 or 7 7 7 3 3 8 8 8 3 3 are valid, but A A A 3 3 2 2 2 K K is not vaild. "Consecutive" here means that the point of the "Triple" in each "Triple plus a Pair" is consecutive.

Bomb: Any four cards with the same point, such as 3 3 3 3 or K K K K.

Rocket: The combination of W1 and W2.

Quartet plus two Singles: One "Bomb" and two "Singles" (two Singles can be the same), such as 4 4 4 4 5 A or 4 4 4 4 K K.

Note: For "Triple plus a Single" and "Quartet plus two Singles", the Single can be W1 or W2.

If the above rules are different from the rules you have seen, please follow the above rules.

Input

The first line of input contains an integer T, indicating the number of test case.
For each test case :
The first line contains a positive integer n, indicating the number of cards HRY still has in his hand.
The second line contains n strings separated by spaces, indicating the cards HRY still has.
$1 \leq T \leq 20000, 1 \leq n \leq 20$.
It is guaranteed that the input is valid.

Output

For each test case output a line. If he can play all of his cards in this round, output "Ye5", else output "N0"(without quotes).

Sample Input

```
11
12
3 4 5 6 7 8 9 10 J Q K A
13
3 4 5 6 7 8 9 10 J Q K A 2
7
6 6 7 7 8 8 8
10
3 3 3 4 4 4 5 5 5 5
8
9 9 9 10 10 10 W1 W2
12
6 6 6 7 7 7 8 8 8 7 8 9
5
4 4 4 4 5
6
2 2 2 2 3 A
7
4 4 4 5 5 5 W2
6
K K A A 2 2
5
3 3 3 W1 W2
```

Sample Output

```
Ye5
N0
N0
Ye5
Ye5
Ye5
N0
Ye5
N0
N0
N0
```

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Problem K
HRY and Repeaters

Time Limit: 3 seconds

Description

-What is the essence of human beings!
-What is the essence of human beings!
-What is the essence of human beings!

This conversation happens every day, as we can see that the essence of human beings is repeaters.

One day HRY is chatting with n repeaters. Soon the conversation became a mess because everyone begins to repeat. Some repeaters repeat a word many times, some repeaters with low quality make spelling mistakes, and some are repeating other repeaters. Now, given the sentence every repeater says, HRY wants to know that given a word, how many times the repeaters from l to r has repeated it? Assume that the sentence spoken by a repeater is S with length n, the word is string T with length m, the times the repeater repeats this word is defined as the number of different positions k where $S_k = T_0, S_{k+1} = T_1, ..., S_{k+m-1} = T_{m-1}$.

Input

The first line contains an integer n, indicating the number of repeaters.
The next n lines each contains a string S_i, which is the sentence spoken by the ith repeater.
The next line contains an integer Q, indicating the number of queries.
The next Q lines each contains two integers l', r', and a string T_i. **Pay attention, you should do following operations to get the real l, r :**

$$l = l' \oplus lastans$$

$$r = r' \oplus lastans$$

$\oplus$ means bitwise xor operation, $lastans$ is the ans of last query, if last query not exist, $lastans = 0$.
$1 \leq n, Q \leq 300000, 1 \leq l \leq r \leq n$.
All strings contain only lowercase letters. It is guaranteed that the total length of S_i does not exceed 300000, the total length of T_i does not exceed 300000.

Output

For each of the Q queries, output a line which contains an integer representing total repeat times of string T_i by repeaters from l to r (not l' to r').

Sample Input

```
3
gugugu
gugugu
gugugu
2
1 2 gu
1 3 guu
```

Sample Output

```
6
1
```

Problem L
HRY and cats

Time Limit: 1 second

Description

Cats are so cute! They are so cute that HRY wants to catch some and bring them home ~~to make some soup~~.
There are n cats in the yard, lying on the ground and sunbathing. HRY wants to make a fence to keep all the cats inside. HRY looked around and found that there are m stumps to make fence. Now he is going to make fence in the following way: he will first choose k stumps $p_1, p_2, ..., p_k$, and connect p_1 and p_2, p_2 and p_3, ..., $p_{n-1}$and p_n, p_n and p_1, and form a **simple polygon**. HRY want all cats **strictly inside** this polygon, which means no cat should be on the edge or point of the polygon. HRY now wonders how many stumps **at least** can he use to keep the cats inside?

Input

The first line contains an integer T, indicating the number of test cases.
For each test case :
The first line contains two integer n, m, indicating the number of cats and the number of stumps.
The next n lines each contains two integers x, y, indicating the coordinates of each cat.
The next m lines each contains two integers x, y, indicating the coordinates of each stump.
$1 \leq T \leq 10, 1 \leq n, m \leq 300, -10^6 \leq x, y \leq 10^6$.

Output

For each test case, output a line of one integer, indicating the number of stumps HRY can use **at least** to catch all cats. If HRY can not catch all cats, just output -1.

Sample Input

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

Sample Output

```
4
```

Problem M
HRY and ball 2

Time Limit: 2 seconds

Description

Define $f(n,m)$ as the number of ways to put n **different balls** to m **identical boxes**, each box must contain at least one ball.
Given a positive integer n, please calculate :

$$\left(\sum_{i=1}^{m} f(m,i)\right) \quad \% \quad 1004535809$$

for each $m(1 \le m \le n)$.

Input

A positive integer n.
$1 \le n \le 10^5$.

Output

Output n lines, an integer per line. The integer in the m-th line represents the result of $\left(\sum_{i=1}^{m} f(m,i)\right)$ % 1004535809.

Sample Input

3

Sample Output

1
2
5

Note

In the example, when $m = 3$, there are the following 5 cases :

$$\left\{ \text{ \{A,B,C\} , \{ A,BC \} , \{B,AC\} , \{C,AB\} , \{ABC\} } \right\}$$