Problem A. The Number of Good Intervals

Orz is a student quite sensitive to numbers. One day, he buys a dress with a sequence of integers on it. Each student in the class has a lucky number. An interval is good for some student if the greatest common divisor of the integers in it is the same as the lucky number of the student. Orz wants to count the number of good intervals for each student in the class.

Input

The first line contains a positive integer $n(1 \leq n \leq 4000000)$ - the length of the sequence.

The second line contains n integers $a_1, a_2, \cdots, a_n(1 \leq a_i \leq 40000, i = 1, 2, \cdots, n)$ - the sequcence on the dress.

The third line contains an integer $m(1 \leq m \leq 200000)$ - the number of students in the class.

The fourth line contains m integers $b_1, b_2, \cdots, b_m(1 \leq b_i \leq 40000, i = 1, 2, \cdots, m)$ - the lucky numbers.

Output

There are m lines in total, and a positive integer in each line is the number of good intervals for each student in turn.

Example

standard input	standard output
3 2 6 3 6 6 5 4 3 2 1	1 0 0 2 2 1

Problem B. lucky string

ZYH has a lucky dictionary. In this dictionary,there are n words(words may not be unique) and the i-th word has a lucky value val_i. ZYH can use this dictonary to estimate a poem's lucky value. A poem's lucky value is equal to the product of the lucky value of the word which the poem is a substring of. For example, if the dictionary has 2 words: "zyh", "yhyh" and the lucky value are 2 and 3 and a poem's content is "yh" so this poem's luck value is equal to $2 \times 3 = 6$. Now ZYH wants to know if he arbitrarily write a non-empty poem with no more than m letters(using 'a' - 'z'), what the expectations of lucky value he will get for different m is.

Input

The first line contains an integer n $\left(1 \leq n \leq 10^4\right)$,the number of words in the dictionary.

The i-th of the next n lines contains a nonempty string s_i, representing the i-th words. The sum of lengths of all titles does not exceed 3×10^5.

The i-th of the next n lines contains a positive integer val_i $\left(val_i \leq 10^6\right)$, representing the i-th word's lucky value.

The next line is a single integer T $\left(1 \leq T \leq 2 \times 10^5\right)$, the number of queries.

The next T lines, each contains a single integer m $\left(1 \leq m \leq 2 \times 10^5\right)$.

Output

For each query, display a single line of integer, representing the answer. It can be proved that the answer can be uniquely written as p/q where p and q are non-negative integers with $\gcd(p,q) = \gcd\left(q, 10^9+7\right) = 1$, and you should display $p \cdot q^{-1} \bmod \left(10^9+7\right)$, where q^{-1} means the multiplicative inverse of q modulo 10^9+7.

Example

standard input	standard output
2 zyh yhyh 2 3 2 3 4	992942342 324129836

Note

Arbitrarily writing means any legal string has the same probability to be written.

Problem C. Chain

You have a chain with N nodes numbered from 1 to N in order and $N-1$ edges on the chain. Each edge has a weight. The sub-chain is defined as several consecutive nodes on the original chain and the edges connecting them. A single point is also a sub-chain. Take out K sub-chains without common points or common edges from the chain, so that the sum of the weights of all the edges contained in the K sub-chains is the largest.

Input

The first line has two integers $N, K (1 \le K \le N \le 100000)$, which represent the number of points on the chain and the number of sub-chains to be taken out.

The second line has $N-1$ integers, the i-th integers $A_i (-100000 \le A_i \le 100000)$ represents the weight of the edge connecting the i-th node and the $(i+1)$-th node.

Output

A number in the first line indicates the maximum.

The two numbers in each of the following K lines indicate the number of the head node and the number of tail node in each sub-chain extracted.

Example

standard input	standard output
9 4 -3 1 2 3 6 -4 17 1	29 9 9 7 8 2 6 1 1

Problem D. Pick Branches

In the game *Animal Crossing: New Horizons*, you live with animal villagers and you need to gather items like tree branches and fruit.

We regard your island as an $n \times n$ chessboard. There are $(n+1)^2$ branches on your island to pick up. Each branch is placed on one intersection of the chessboard.

For each $0 \le x \le n$, $0 \le y \le n$, there is a branch placed on (x, y). You are at $(0, 0)$, walking along a straight line and picking up the branches on your way. You expect exactly m branches. Please calculate the number of different plans you can choose to get m branches.

Two plans are different when there is a branch at (x, y) collected in planA but not collected in planB.

Input

The first line contains only one integer T $(1 \le T \le 100000)$, which is the number of test cases.

Each test case will contain two integer n, $m(1 \le n, m \le 5000000)$.

Output

For each query print one integer in a single line — the number of different plans you can choose to get m branches.

Example

standard input	standard output
5 2 2 2 3 23 5 3451 32 2333 1212	2 3 8 512 0

Problem E. Insecure Chaotic Cryptography

Alice and Bob are sending messages using the chaotic cryptography.

What is the chaotic cryptography? Recall in number theory, it's easy to calculate $c \equiv p^n (mod\ MOD)$ given p, n, MOD. Yet it's hard to calculate p given c, n, MOD. Likewise, in chaotic cryptography we define a function f. It's easy to calculate $c = f^n(p)$ yet it's hard to calculate $p = f^{-n}(c)$.

In this problem Alice and Bob are using the logistic map $L(x) = \mu x(1-x)$.

Assuming that the plaintext is "ABCDEFGH"(41 42 43 44 45 46 47 48 in hex), $\mu = 3.6, n = 10000$, the seed key $x_0 = 0.1$.

Then key $x_n = L(x_{n-1}) = \mu x_{n-1}(1 - x_{n-1}) = \cdots = 0.812934 \cdots = C9\ 0B\ 03\ 00\ 8F\ 03\ EA\ 3F$.

The ciphered text is $41\ 42\ 43\ 44\ 45\ 46\ 47\ 48 \oplus C9\ 0B\ 03\ 00\ 8F\ 03\ EA\ 3F = 88\ 49\ 40\ 44\ CA\ 45\ AD\ 77$.

The word "Chaotic" indicates that x_n is extremely sensitive to the initial value. Given the seed key $x_0 = 0.100001$, then key $x_n = 0.899452 = 0A\ F4\ 0E\ 4D\ 50\ C8\ EC\ 3F$. Totally different!

But logistic function is chaotic iff $3.5699456 < \mu \le 4$ and $0 \le x < 1$. What if μ doesn't lie on the section?

Given n, μ, x_n, calculate any possible x_0.

Note: this problem has nothing to do with the actual chaotic cryptography.

Input

The first line contains the number of queries, $q (1 \le q \le 100)$.

The following q lines each contains an integer $n (10000 \le n \le 100000)$ and two real number $\mu (3 < \mu < 3.5)$ and $x_n (0 \le x_n < 1)$. There are at most 12 digits after the point.

Output

For each query, output any possible x_0.

Example

standard input	standard output
1 10000 3.303410637883 0.4784052650277	0.650912

Note

Your answer should satisfy $|L^n(x_0) - x_n| < 10^{-6}$.

Problem F. Poker

Fujiwara no Mokou and **Houraisan Kaguya** do not want to play ping-pong today, they have decided to play Texas hold'em.

Now let me intruduce one of the simplified rule of Texas hold'em.

For a deck of Poker Cards,there are 52 cards.And each card have two states: pips and suits.

Pips are used to compare two cards, there 13 kinds of pips(A,K,Q,J,10,9,8,7,6,5,4,3,2). And there are 4 kinds of suits:diamonds, clubs, hearts and spades.

(Always called FangPian, CaoHua, HongTao, HeiTao in Chinese.)

Which means, there **aren't** two cards with same pips and suits in a match.

For one match of two players, there are 9 differents cards.Each player have two **pocket cards** at the beginning of the match.

And only himself/herself knows what they are.

Then the Dealer(who host the game) will deal a flop : show 3 face-up community cards.

And after the betting round, deal the turn and the river : another 2 face-up community cards.

When the community cards are all shown, the players show there pocket cards and choose 5 cards in the 7 cards(2 pocket cards + 5 community cards)to construct the Hand.

After that, compare your Hand with another player,the player who has bigger Hand values will win the game.

For all the possible types of Hand, the following table shows the possible Hand values in increasing order.

1. Royal flush:Straight flush from Ten to Ace.(A K Q J 10)
2. Straight flush:Straight of the **same** suit.
3. Four of a kind:Four cards of the same value.(A A A A 10)
4. Full house:Combination of three of a kind and a pair.(3 3 3 10 10)
5. Flush:5 cards of the same suit.
6. Straight:Sequence of 5 cards in continuous increasing value.(2 3 4 5 6)
7. Three of a kind:Three cards with the same value.(4 4 4 3 7)
8. Two pairs:Two times two cards with the same value.(4 4 5 5 6)
9. Pair:Two cards with the same value.
10. Highcard:Simple value of the card. Lowest: 2 - Highest: Ace

If a Hand match many kinds of Hand values above, now we consider it as the bigger one.

The Hand with bigger values is absolutely bigger,for the Hands with the same value, we compare them with the following rules.

1. Royal flush:Draw.
2. Straight flush:Compare with the bigger card
3. Four of a kind:First compare the four cards of the same value.Then the other one.
4. Full house:Combination of three of a kind and a pair.(3 3 3 10 10)

5. Flush:Sort the cards by their pips and compare them one-by-one.(From big to small)
6. Straight:Compare with the bigger card.
7. Three of a kind:First compare the three cards of the same value.The the other two in the pip's order.
8. Two pairs:First the bigger pair, then the smaller pair, and last the other one card.
9. Pair:First the pair, then the other cards in the pip's order.
10. Highcard:Sort the cards by their pips and compare them one-by-one.

And there are two points need to pay attention to.

1. The suit of a card do not influence the compare of two Hands of the same Hand value.
2. Ace(A) is also a part of Straight of A K Q J 10 and the part of 1 2 3 4 5.When it become 1 but not A, it's smaller then 2.Or it's the biggest card.

Some cases to get better understanding:

`A A A 3 3` $>$ `Q Q Q 3 3`

`7 8 9 10 J` $>$ `K K K 4 3`

`9 9 4 7 10` $>$ `9 9 4 7 8`

`5 6 8 9 K` $>$ `5 6 9 J Q`

`A K Q J 10` $>$ `1 2 3 4 5`

Fujiwara no Mokou have already know the two pocket cards of herself and **Houraisan Kaguya** , and the first 3 community cards are already shown.

If the following 2 community cards are chosen **randomly** , Fujiwara no Mokou wants to know the possibility of she can win the match.

Note:Draw isn't win.

Input

The first line contains a positive integer T $(T \leq 10)$, indicates there are T test cases.

For one card, there are 2 characters to describe it.

The first character: one of S H D C, indicates the suit.

The second: one of A K Q J T 2-9,T is 10, indicates the pips.

For one test case, contains 3 lines.

The first line:the two pocket cards of Fujiwara no Mokou.

The second line:the two pocket cards of Houraisan Kaguya.

The third line:the three community cards already shown.

Output

For each test case, output a fraction, indicates the answer.

Note the answer should be the simplest true fraction.And if the answer is zero, the answer should be 0/1

Example

standard input	standard output
3 SK SJ HJ HA SA SQ ST SK HA CT C3 HQ SQ DQ S9 SA DA HT DJ DQ DK	1/1 122/165 0/1