A. Legs

Input file: standard input
Output file: standard output
Time limit: 2 seconds
Memory limit: 256 megabytes

It's another beautiful day on Farmer John's farm.

After Farmer John arrived at his farm, he counted n legs. It is known only chickens and cows live on the farm, and a chicken has 2 legs while a cow has 4.

What is the minimum number of animals Farmer John can have on his farm assuming he counted the legs of all animals?

Input

The first line contains single integer t ($1 \leq t \leq 10^3$) — the number of test cases.

Each test case contains an integer n ($2 \leq n \leq 2 \cdot 10^3$, n **is even**).

Output

For each test case, output an integer, the minimum number of animals Farmer John can have on his farm.

Standard Input	Standard Output
3 2 6 8	1 2 2

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B. Scale

Input file: standard input
Output file: standard output
Time limit: 2 seconds
Memory limit: 256 megabytes

Tina has a square grid with n rows and n columns. Each cell in the grid is either 0 or 1.

Tina wants to reduce the grid by a factor of k (k **is a divisor of** n). To do this, Tina splits the grid into $k \times k$ nonoverlapping blocks of cells such that every cell belongs to exactly one block.

Tina then replaces each block of cells with a single cell equal to the value of the cells in the block. **It is guaranteed that every cell in the same block has the same value**.

For example, the following demonstration shows a grid being reduced by factor of 3.

Original grid

0	0	0	1	1	1
0	0	0	1	1	1
0	0	0	1	1	1
1	1	1	0	0	0
1	1	1	0	0	0
1	1	1	0	0	0

Reduced grid

0	1
1	0

Help Tina reduce the grid by a factor of k.

Input

The first line contains t ($1 \le t \le 100$) – the number of test cases.

The first line of each test case contains two integers n and k ($1 \le n \le 1000$, $1 \le k \le n$, k **is a divisor of** n) — the number of rows and columns of the grid, and the factor that Tina wants to reduce the grid by.

Each of the following n lines contain n characters describing the cells of the grid. Each character is either 0 or 1. It is guaranteed every k by k block has the same value.

It is guaranteed the sum of n over all test cases does not exceed 1000.

Output

For each test case, output the grid reduced by a factor of k on a new line.

Standard Input	Standard Output

4 4 4 0000 0000 0000 0000 6 3 000111 000111 000111 111000 111000 111000 6 2 001100 001100 111111 111111 110000 110000 8 1 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111	0 01 10 010 111 100 11111111 11111111 11111111 11111111 11111111 11111111 11111111 11111111

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C. Sort

Input file: standard input
Output file: standard output
Time limit: 5 seconds
Memory limit: 256 megabytes

You are given two strings a and b of length n. Then, you are (forced against your will) to answer q queries.

For each query, you are given a range bounded by l and r. In one operation, you can choose an integer i ($l \leq i \leq r$) and set $a_i = x$ where x is any character you desire. Output the minimum number of operations you must perform such that $\texttt{sorted(a[l..r])} = \texttt{sorted(b[l..r])}$. **The operations you perform on one query does not affect other queries.**

For an arbitrary string c, $\texttt{sorted(c[l..r])}$ denotes the substring consisting of characters $c_l, c_{l+1}, \ldots, c_r$ sorted in lexicographical order.

Input

The first line contains t ($1 \leq t \leq 1000$) – the number of test cases.

The first line of each test case contains two integers n and q ($1 \leq n, q \leq 2 \cdot 10^5$) – the length of both strings and the number of queries.

The following line contains a of length n. It is guaranteed a only contains lowercase latin letters.

The following line contains b of length n. It is guaranteed b only contains lowercase latin letters.

The following q lines contain two integers l and r ($1 \leq l \leq r \leq n$) – the range of the query.

It is guaranteed the sum of n and q over all test cases does not exceed $2 \cdot 10^5$.

Output

For each query, output an integer, the minimum number of operations you need to perform in a new line.

Standard Input	Standard Output
3 5 3 abcde edcba 1 5 1 4 3 3 4 2 zzde azbe 1 3 1 4 6 3 uwuwuw wuwuwu 2 4 1 3	0 1 0 2 2 1 1 0

1 6	

Note

For the first query, $\texttt{sorted(a[1..5])} = \texttt{abcde}$ and $\texttt{sorted(b[1..5])} = \texttt{abcde}$, so no operations are necessary.

For the second query, you need to set $a_1 = \texttt{e}$. Then, $\texttt{sorted(a[1..4])} = \texttt{sorted(b[1..4])} = \texttt{bcde}$.

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D. Fun

Input file: standard input
Output file: standard output
Time limit: 2 seconds
Memory limit: 256 megabytes

Counting is Fun!

— satyam343

Given two integers n and x, find the number of triplets (a, b, c) of **positive integers** such that $ab + ac + bc \le n$ and $a + b + c \le x$.

Note that order matters (e.g. $(1, 1, 2)$ and $(1, 2, 1)$ are treated as different) and a, b, c must be strictly greater than 0.

Input

The first line contains a single integer t ($1 \le t \le 10^4$) — the number of test cases.

Each test case contains two integers n and x ($1 \le n, x \le 10^6$).

It is guaranteed that the sum of n over all test cases does not exceed 10^6 and that the sum of x over all test cases does not exceed 10^6.

Output

Output a single integer — the number of triplets (a, b, c) of positive integers such that $ab + ac + bc \le n$ and $a + b + c \le x$.

Standard Input	Standard Output
4 7 4 10 5 7 1000 900000 400000	4 10 7 1768016938

Note

In the first test case, the triplets are $(1, 1, 1)$, $(1, 1, 2)$, $(1, 2, 1)$, and $(2, 1, 1)$.

In the second test case, the triplets are $(1, 1, 1)$, $(1, 1, 2)$, $(1, 1, 3)$, $(1, 2, 1)$, $(1, 2, 2)$, $(1, 3, 1)$, $(2, 1, 1)$, $(2, 1, 2)$, $(2, 2, 1)$, and $(3, 1, 1)$.

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E. Decode

Input file: standard input
Output file: standard output
Time limit: 2 seconds
Memory limit: 256 megabytes

In a desperate attempt to obtain your ~~waifu~~ favorite character, you have hacked into the source code of the game. After days of struggling, you finally find the binary string that encodes the gacha system of the game. In order to decode it, you must first solve the following problem.

You are given a binary string s of length n. For each pair of integers (l, r) $(1 \leq l \leq r \leq n)$, count the number of pairs (x, y) $(l \leq x \leq y \leq r)$ such that the amount of `0` equals the amount of `1` in the substring $s_x s_{x+1} \ldots s_y$.

Output the sum of counts over all possible (l, r) modulo $10^9 + 7$.

Input

The first line contains t $(1 \leq t \leq 1000)$ — the number of test cases.

Each test case contains a binary string s $(1 \leq |s| \leq 2 \cdot 10^5)$. It is guaranteed s only contains characters `0` and `1`.

It is guaranteed the sum of $|s|$ over all test cases does not exceed $2 \cdot 10^5$.

Output

For each test case, output an integer, the answer modulo $10^9 + 7$.

Standard Input	Standard Output
4 0000 01010101 1100111001 11000000111	0 130 147 70

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F. Bomb

Input file: standard input
Output file: standard output
Time limit: 2 seconds
Memory limit: 256 megabytes

Sparkle gives you two arrays a and b of length n. Initially, your score is 0. In one operation, you can choose an integer i and add a_i to your score. Then, you must set $a_i = \max(0, a_i - b_i)$.

You only have time to perform k operations before Sparkle sets off a nuclear bomb! What is the maximum score you can acquire after k operations?

Input

The first line contains t ($1 \le t \le 1000$) — the number of test cases.

The first line of each test case contains n and k ($1 \le n \le 2 \cdot 10^5, 1 \le k \le 10^9$) — the length of the arrays and the number of operations you can perform.

The following line contains n integers $a_1, a_2, \ldots a_n$ ($1 \le a_i \le 10^9$).

The following line contains n integers $b_1, b_2, \ldots b_n$ ($1 \le b_i \le 10^9$).

It is guaranteed that the sum of n for all test cases does not exceed $2 \cdot 10^5$.

Output

For each test case, output an integer, the maximum score you can acquire after k operations.

Standard Input	Standard Output
5 3 4 5 6 7 2 3 4 5 9 32 52 68 64 14 18 14 53 24 8 5 1000 1 2 3 4 5 5 4 3 2 1 1 1000000 1000000 1 10 6 3 3 5 10 6 8 6 8 7 7 6 1 7 4 1 1 8 9 3 1	21 349 27 500000500000 47

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G. Penacony

Input file: standard input
Output file: standard output
Time limit: 3 seconds
Memory limit: 512 megabytes

On *Penacony, The Land of the Dreams*, there exists n houses and n roads. There exists a road between house i and $i+1$ for all $1 \leq i \leq n-1$ and a road between house n and house 1. All roads are bidirectional. However, due to the crisis on Penacony, the overseeing family has gone into debt and may not be able to maintain all roads.

There are m pairs of friendships between the residents of Penacony. If the resident living in house a is friends with the resident living in house b, there must be a path between houses a and b through maintained roads.

What is the minimum number of roads that must be maintained?

Input

The first line contains t ($1 \leq t \leq 10^4$) – the number of test cases.

The first line of each test case contains two integers n and m ($3 \leq n \leq 2 \cdot 10^5, 1 \leq m \leq 2 \cdot 10^5$) – the number of houses and the number of friendships.

The next m lines contain two integers a and b ($1 \leq a < b \leq n$) – the resident in house a is friends with the resident in house b. It is guaranteed all (a, b) are distinct.

It is guaranteed the sum of n and m over all test cases does not exceed $2 \cdot 10^5$.

Output

For each test case, output an integer, the minimum number of roads that must be maintained.

Standard Input	Standard Output
7 8 3 1 8 2 7 4 5 13 4 1 13 2 12 3 11 4 10 10 2 2 3 3 4 10 4 3 8 5 10 2 10 4 10 4 1	4 7 2 7 2 3 3

1 3 5 2 3 5 1 4 5 2 2 5 1 3	

Note

For the first test case, the following roads must be maintained:

- $8 \leftrightarrow 1$
- $7 \leftrightarrow 8$
- $1 \leftrightarrow 2$
- $4 \leftrightarrow 5$