Biweekly Competitive Programming Contest

6 February 2026

SMU Competitive Programming

Blank lines have been provided in the sample input for clearer separation of test cases.
These are omitted in the actual input to the problem.

Approximate difficulties:

- Problem A - AtCoder 300 - 400 / CF 900 - 1100
- Problem B - AtCoder 500 - 700 / CF 1150 - 1300
- Problem C - AtCoder 900 - 1100 / CF 1300 - 1500
- Problem D - AtCoder 900 - 1400 / CF 1300 - 1800
- Problem E - AtCoder 1000 - 1600 / CF 1300 - 1800

Problems A-C will contain topics covered during training.
Problems D and E *might* contain topics slightly beyond what's covered so far.

Problem A. Buy Balls

Time limit: 2 s *Memory limit: 512 MB*

There are N black balls and M white balls.
Each ball has a value. The value of the i-th black ball ($1 \leq i \leq N$) is B_i, and the value of the j-th white ball ($1 \leq j \leq M$) is W_j.
Choose zero or more balls so that the number of black balls is at least the number of white balls chosen. Among all such choices, find the maximum possible sum of the values of the chosen balls.

Input The first line contains an integer t ($1 \leq t \leq 10^3$), the number of test cases. For each test case,

- The first line is given by two space-separated integers N and M ($1 \leq N, M \leq 2 \times 10^5$).
- The second line contains N space-separated integers $B_1, B_2 \cdots B_N$ ($-10^9 \leq B_i \leq 10^9$)
- The third line contains M space-separated integers $W_1, W_2, \cdots, W_M$ ($-10^9 \leq W_j \leq 10^9$)

It is guaranteed that the sum of N and sum of M over all test cases will not exceed 2×10^5.

Output t lines, the i-th line representing the answer to the i-th test case.

Sample Input	Sample Output
3 4 3 8 5 -1 3 3 -2 -4 4 3 5 -10 -2 -5 8 1 4 3 5 -36 -33 -31 12 12 28 24 27	19 15 0

Note

- In the first test case, if you choose the 1st, 2nd, and 4th black balls, and the 1st white ball, the sum of their values is $8 + 5 + 3 + 3 = 19$, which is the maximum.
- In the second test case, if you choose the 1st and 3rd black balls, and the 1st and 3rd white balls, the sum of their values is $5 + (-2) + 8 + 4 = 15$, which is the maximum.

Problem B. Range Replace

Time limit: 2 s *Memory limit: 512 MB*

You are given a sequence $A = (A_1, A_2 \cdots A_N)$ of length N. You perform the following operation exactly once.

- Choose a pair of integers (L, R) such that $1 \leq L \leq R \leq N$. Replace each of $A_L, A_{L+1}, \cdots A_R$ with A_L.

How many different sequences are possible after the operation?

Input The first line contains an integer t ($1 \leq t \leq 10^5$), the number of test cases. For each test case,

- The first line is an integer N ($1 \leq N \leq 10^6$), the length of the integer array.
- The next line contains a sequence of N space-separated integers $A_1, A_2, \cdots, A_N$ ($1 \leq A_i \leq N$).

It is guaranteed that the sum of N over all test cases will not exceed 10^6.

Output t lines, the i-th line representing the answer to the i-th test case.

Sample Input	Sample Output
2 4 1 1 2 3 10 2 5 6 5 2 1 7 9 7 2	4 41

Note In the first test case, the possible sequences after the operation are [1,1,1,1], [1,1,1,3], [1,1,2,2], [1,1,2,3]. For example, [1,1,1,3] can be obtained by performing the operation $L = 2, R = 3$.

Problem C. Silk XOR Road

Time limit: 2 s *Memory limit: 512 MB*

The legendary Silk XOR Road was not just a trade route; it was a network connecting civilizations. It consisted of N ancient cities, linked by $N-1$ routes, forming a network with no cycles. Each route between two cities was assigned a *luck index* w - a number representing the links and opportunities on that path. In general, the path from any city u to any city v has a *luck index* equal to the XOR of all the luck indices on the simple path from city u to city v.

An archaeologist has just discovered a map of this network along with all the luck indices. To understand the prosperity and economic scale of this ancient civilization, he wants to calculate the total luck value of the entire network. This is the sum of all the "luck indices" for every unordered pair of cities on the Silk XOR Road.

Your task is to help the archaeologist solve this mystery.

Input The first line contains an integer N ($2 \le N \le 10^5$) - the number of cities. The next $N-1$ lines each contain three integers u, v, w ($1 \le u, v \le N, 0 \le w < 2^{26}$, representing a route connecting city u and v with a luck index of w.

Output A single line containing the total luck value of the entire network.

Sample Input	Sample Output
4 1 2 3 2 3 5 2 4 6	28

Note The map in the example has the following cities and routes: city 1 is connected to 2 ($w_1 = 3$), city 2 is connected to 3 ($w_2 = 5$), and city 2 is connected to 4 ($w_3 = 6$). We have 6 possible journeys between pairs of cities.
We have 6 possible journeys:

- Journey (1,2): Luck index = 3
- Journey (1,3): Traverses routes $(1,2)$ and $(2,3)$. Value = $3 \bigoplus 5 = 6$
- Journey (1,4): Traverses routes (1,2) and (2,4). Value = $3 \bigoplus 6 = 5$
- Journey (2,3): Luck index = 5
- Journey (2,4): Luck index = 6
- Journey (3,4): Traverses routes (3,2) and (2,4). Value = $5 \bigoplus 6 = 3$

The total economic value is $3 + 6 + 5 + 5 + 6 + 3 = 28$. (The symbol $\bigoplus$ denotes the XOR operation).

Problem D. Cosmic Commute

Time limit: 2 s *Memory limit: 512 MB*

A long time ago, in a galaxy far, far away, the InterCosmic Passage Company (ICPC) operates a complex railway system using *light trains*. Each planet has exactly one train station and each light train connects two distinct planets of the galaxy, going back and forth between them. Just recently, the InterCosmic Passage Company established a teleportation system, which is now in its testing phase. Some train stations are now extended by a *wormhole*. All wormholes are connected to each other, and it is possible to teleport from one wormhole to another instantaneously. To avoid overloading the new system, each citizen of the galaxy is only allowed to teleport at most once a day.
Charlie lives on planet Gallifrey and works on planet Sontar. It is her first day of work, and she is already terribly late because her stupid alarm clock did not go off. On top of that, the new teleportation system is malfunctioning today of all days, and the destination wormhole cannot be chosen. Instead, after entering a wormhole, one is teleported to a wormhole that is chosen **uniformly at random** among all other wormholes. It is impossible to be at the same train station after teleportation.

Despite all her bad luck, Charlie is dead set on getting to work on time. Since all light trains are very slow, she wants to take as few light trains as possible. What is the **minimum expected** number of light trains she has to take to get to work if she can use the (malfunctioning) teleportation system at most once?

Input

- The first line contains three integers n, m, k ($2 \leq n \leq 2 \times 10^5, n-1 \leq m \leq 10^6, 2 \leq k \leq n$), the number of planets in the galaxy, light trains and wormholes. Planet 1 is Charlie's home planet Gallifrey, and planet n is Sontar, where Charlie works.
- One line containing k distinct integers, the planets whose train stations each have a wormhole (in addition to the light trains)
- Then, m lines follow: each containing two integers a and b ($1 \leq a, b \leq n, a \neq b$), describing a light train between planets a and b. It is guaranteed that all light trains are pairwise distinct.

It is guaranteed that it is possible to travel from any planet to any other planet of the galaxy using only light trains.

Output A single reduced fraction `a/b`, where a is the numerator and b is the denominator, representing the minimum expected number of light trains Charlie has to take to get to work if she can use the (malfunctioning) teleportation system at most once.

A reduced fraction a/b requires $\gcd(a, b) = 1$.

Expectation of a Discrete Random Variable: Let X be a discrete random variable and x denote one outcome of X in the sample space S_x. The expectation $\mathbb{E}[X]$ is given by

$$\mathbb{E}[X] = \sum_{x \in S_x} \mathbb{P}(X = x) \cdot x,$$

where $\mathbb{P}(X = x)$ denotes the probability of observing outcome x.

Please turn over for the samples.

Sample Input	Sample Output
5 5 3 2 3 4 1 2 1 3 2 4 3 4 4 5	5/2

Sample Input	Sample Output
5 6 3 2 3 4 1 2 1 3 2 4 3 4 4 5 1 4	2/1

Problem E. Parallel Lines

Time limit: 2.5 s *Memory limit: 512 MB*

Once upon a time, there were k parallel lines in a two-dimensional plane and n points on these lines. It is known that there were **at least two** points on each line.

Now you are given these n points, and your task is to find those k parallel lines.

Input The first line contains two integers n, k ($2 \le n \le 10^4, 1 \le k \le \min(50, \frac{n}{2})$), denoting the number of points and parallel lines.

Each of the next n lines contains two integers x_i, y_i ($1 \le x_i, y_i \le 10^9$), denoting the coordinates of the i-th point.

It is guaranteed that n points are unique.

Output k lines. For each line, first output an integer m ($2 \le m \le n$), the number of points on this line, followed by m integers denoting the **indices** of these points.

Every point index $1, 2, \cdots, n$ must appear in exactly one output line. The k geometric lines determined by your groups must be parallel and distinct.

If multiple solutions exist, you may output any valid solution. It is also guaranteed that there is a valid solution to distribute the n points onto k parallel lines.

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