Joint Relocation

Input file:	`standard input`
Output file:	`standard output`
Time limit:	4 seconds
Memory limit:	1024 megabytes

VegiCat owns a company with n employees in k nonempty teams. The employees live along a straight road, represented by a number line. VegiCat wants to arrange two meeting points for them.

VegiCat divides the teams into two sets, A and B, with each team in exactly one set. He chooses a meeting point for each set at any real coordinate. **All employees on the same team must go to the same meeting point.** Each team in set A goes to the meeting point for A, and each team in set B goes to the meeting point for B. Either set may be empty.

Let S_A list the home positions of all employees on teams in A, and define S_B similarly for B. Each employee is counted separately, even when home positions repeat.

For a list $S = (x_1, x_2, \ldots, x_m)$ of home positions, the minimum total distance for these employees to travel to one meeting point is

$$M(S) = \min_{p \in \mathbb{R}} \sum_{j=1}^{m} |x_j - p|.$$

Define $M(S) = 0$ when S is empty. Help VegiCat minimize $M(S_A) + M(S_B)$ over all ways to divide the teams into the two sets.

Input

The first line contains an integer T ($1 \le T \le 3 \cdot 10^5$), the number of test cases. The description of the test cases follows.

The first line of each test case contains two integers n and k ($1 \le k \le n \le 3 \cdot 10^5$), denoting the number of employees and the number of teams, respectively.

Each of the next k lines describes one team. The i-th line contains an integer m_i ($1 \le m_i \le n$), the number of employees on team i, followed by m_i integers $x_{i,1}, \ldots, x_{i,m_i}$ ($1 \le x_{i,j} \le 10^7$), their home positions. The sum of all m_i in a test case is n.

Home positions may repeat and may be given in any order.

It is guaranteed that the sum of n over all test cases does not exceed $3 \cdot 10^5$.

Output

For each test case, output an integer — the minimum possible total travel distance.

Example

standard input	standard output
2 4 2 2 1 3 2 8 10 8 3 3 4 12 1 2 3 2 3 9 8 10	4 15

Note

In the first test case, VegiCat sends team 1 to a meeting point at position 1 and team 2 to a meeting point at position 8. The employees in each team travel a total distance of 2, giving the answer 4.

In the second test case, VegiCat chooses meeting points at 3 and 9. He sends teams 1 and 2 to the first meeting point, and team 3 to the second. The employees in teams 1, 2, and 3 travel total distances of 12, 1, and 2, respectively, giving the answer 15.