

Being a Cheater

Input file: **standard input**
Output file: **standard output**
Time limit: 5 seconds
Memory limit: 1024 megabytes

Consider a quiz show with the following rules: there are n participants and k question topics numbered from 1 to k . Each player has a strong topic a_i and a weak topic b_i . Of course, $a_i \neq b_i$. A player always answers correctly on a question from their strong topic, always answers incorrectly on a question from their weak topic, and on a question from any of the middle topics they answer correctly on the first $L - 1$ questions, and starting from the L -th question they answer incorrectly.

However, things are not so simple. Among the players, there is one cheater! The cheater always answers all questions correctly, ignoring the previous rules.

As the host, you want to identify the cheater using the minimum number of questions. For each question, you choose a topic, and this question is asked to all participants. After that, you learn who answered the question correctly and who answered incorrectly. Then you may ask the next question. You know that exactly one of the players is the cheater.

Let the minimum number of questions that must be asked to guarantee identifying the cheater for the game with participants numbered $l, l + 1, \dots, r$ be $f(l, r)$.

Compute $\sum_{l=1}^n \sum_{r=l}^n f(l, r)$. In other words, consider all possible contiguous segments of players from l to r , where $1 \leq l \leq r \leq n$.

For each such segment, determine the minimum number of questions needed to identify the cheater with certainty, assuming that only players numbered from l to r participate in the game.

Your task is to find the sum of these values over all such segments.

Input

The first line contains three integers n , k , and L ($2 \leq n \leq 200\,000$, $2 \leq k \leq n$, $2 \leq L \leq n$).

The second line contains n integers $a_1, a_2, \dots, a_n$ ($1 \leq a_i \leq k$).

The third line contains n integers $b_1, b_2, \dots, b_n$ ($1 \leq b_i \leq k$).

For each i , $a_i \neq b_i$.

Output

Print a single integer — the sum of $f(l, r)$ over all pairs of indices l and r satisfying $1 \leq l \leq r \leq n$.

Scoring

The tests of the problem are divided into 16 subgroups. Points for a subgroup are awarded only if all its tests and all tests of the required subgroups listed in the table are passed. The table gives additional constraints; the remaining constraints are the same as the general ones.

Subgroup	Points	Additional constraints			Required subgroups
		n	k	Other conditions	
0	0	Examples from the statement			–
1	2	–	–	$b_i = 1$ for all i	–
2	7	$n \leq 7$	–	–	–
3	9	$n \leq 70$	–	–	0, 2
4	5	$n \leq 3000$	$k \leq 8$	–	0, 2
5	6	$n \leq 3000$	$k \leq 30$	–	0, 2, 4
6	7	$n \leq 3000$	–	–	0, 2–5
7	4	–	$k = 2$	–	–
8	5	–	$k = 3$	$L = 2$	–
9	11	–	–	$L \leq 20$	0, 2, 8
10	5	–	–	$L \leq 200$	0, 2, 3, 8, 9
11	6	–	–	$L = n$	–
12	16	–	$k = n$	–	–
13	7	–	–	$L = k - 1$	8
14	5	$n \leq 100\,000$	–	–	0, 2–6
15	4	$n \leq 150\,000$	–	–	0, 2–6, 14
16	1	–	–	–	0–15

Examples

standard input	standard output
3 3 3 2 3 2 1 1 1	3
4 2 3 1 2 1 2 2 1 2 1	7
6 3 2 1 2 1 2 1 2 2 1 3 3 2 1	23
4 4 2 2 3 4 1 1 2 3 4	9
5 3 5 2 3 1 3 1 1 1 2 2 3	13
20 5 2 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 2 3 4 5 1 3 4 5 1 2 4 5 1 2 3 5 1 2 3 4	448

Note

If there is only one person in the game, that person is the cheater, so no questions are needed.

In the first example, the weak topic of each player is topic 1. If there are at least two participants, the host asks one question on this topic. All honest players answer incorrectly, and the cheater answers correctly, so the host immediately identifies them. Three games with one participant, two games with two participants, and one game with all three participants are considered. Therefore, the answer is $3 \cdot 0 + 2 \cdot 1 + 1 \cdot 1 = 3$.

In the second example, players 1 and 3 have strong topic 1 and weak topic 2, while players 2 and 4 have the opposite. For the game with four participants, the host asks one question on topic 1, and then one on topic 2. Each honest player will make a mistake on the question from their weak topic. Only the cheater will answer both questions correctly. One question is not enough: if the cheater is one of the two players for whom the chosen topic is strong, both of these players will answer correctly and it will be impossible to distinguish between them. Thus, $f(1, 4) = 2$.

In the game with two participants, it is enough to ask the weak topic of one of them. If they answer correctly, they are the cheater; if incorrectly, the cheater is the second player. In the game with three participants, we choose a topic that is weak for two of them. If one of those two answers correctly, they are the cheater; if both answer incorrectly, the cheater is the third player. Therefore, the three games with two participants and the two games with three participants have complexity 1. The total sum is $3 \cdot 1 + 2 \cdot 1 + 2 = 7$.

In the sixth example, consider the game with only players 1, 2, ..., 10. The host first asks two questions on topic 1. For players 1 and 6, this topic is strong, so both of them answer correctly. For each of the other eight players, it is weak or middle: if such a player is honest, they will make at least one mistake. If one of these eight players answers both questions correctly, then they are the cheater. Otherwise, the cheater is one of players 1 and 6.

To distinguish between these two players, the host asks one more question on topic 2. For player 1, this topic is weak. If they answer correctly, they are the cheater. If they answer incorrectly, then the cheater is player 6, found by elimination. For player 6, topic 2 is middle, and this is the first question on it, so they will answer correctly even if they are honest. In the worst case, 3 questions are needed: first $L = 2$ questions on one topic, then one more on another topic.

Two questions are not enough. If the same topic is asked twice, both players for whom it is strong will answer correctly. If the cheater is one of them, it will be impossible to distinguish them from the other. If two different topics are asked once each, honest players can make mistakes only on their weak topics. Each topic is weak for exactly two of the first ten players, so neither of the chosen topics will be weak for at least six players. All of them will answer both questions correctly. If the cheater is one of them, it will be impossible to determine which one. Therefore, $f(1, 10) = 3$.

In the same example, consider the game with all 20 participants. The host asks two questions on topic 1 and two questions on topic 2, for a total of 4 questions. Each player has only one strong topic, so at least one of the chosen topics is weak or middle for them. If the player is honest, on a weak topic they will make a mistake immediately, and on a middle topic they will make a mistake on the second question, since $L = 2$. Thus, every honest player will make at least one mistake, while the cheater will answer all four questions correctly.

The minimum number of questions for this game is 4, so $f(1, 20) = 4$.