Graph Operations

There is an undirected graph with N nodes, numbered from 0 to $N-1$. Initially, there are B edges where the i-th edge connects nodes U_i and V_i with weight W_i.

Next, the graph undergoes A operations. In the i-th operation, edges of weight X_i are added between every pair of nodes for which the difference between their indices equals D_i. (You don't need to solve the problem for every operation, you just need to output the final answer).

Let G be the final graph, and let its connected components be $G_0, G_1, \ldots, G_{k-1}$. We define $f(G_i)$ as the weight (sum of edge weights) of the minimum spanning tree of G_i. Your task is to compute the $\sum_{i=0}^{k-1} f(G_i)$ modulo 998244353.

Spanning tree - A spanning tree of a graph on n vertices is a subset of $n-1$ edges that form a tree.

Weight of a spanning tree - The weight of a spanning tree is the sum of the edge weights of a spanning tree.

Connected components - A connected component of an undirected graph is a maximal subgraph in which any two vertices are connected by a path, and which is not connected to any additional vertices in the original graph.

Constraints

- $1 \leq N \leq 10^{18}$
- $0 \leq A, B \leq 5 \times 10^4$
- $1 \leq D_i \leq N \quad (1 \leq i \leq A)$
- $0 \leq X_i < 998244353 \quad (1 \leq i \leq A)$
- $0 \leq U_i, V_i < N, U_i \neq V_i \quad (1 \leq i \leq B)$
- $0 \leq W_i < 998244353 \quad (1 \leq i \leq B)$

Implementation Details

- You should include the header file `graph.h`.
- You have to implement the following function:

```
long long graph(long long N, int A, int B, vector < int > U, vector < int > V,

vector < int > W, vector < int > D, vector < int > X);
```

- N is the number of nodes, A is the number of operations, B is the number of initial edges, and there is an initial edge connecting $U[i]$ and $V[i]$ with weight $W[i]$. $D[i]$ represents the difference between the nodes for operation A_i, and $X[i]$ is the weight of the edges.

Subtasks

Subtask	Points	Constraints
1	4	$N \leq 200,000$, $A \leq 20$
2	8	$N \leq 200,000$
3	6	$A = 2$, $B = 0$
4	18	$A = 2$, $B \leq 50,000$
5	12	$A \leq 1000$, $B = 0$, $W_i = 1$, $X_i = 1$
6	12	$A \leq 1000$, $B \leq 200$
7	12	$B = 0$
8	10	$W_i = 1$, $X_i = 1$
9	18	No additional constraints

Sample Grader

The sample grader takes input the following way:

- Line 1: N A B
- Line $i + 1$: D_i X_i $(1 \leq i \leq A)$
- Line $A + j + 1$: U_j V_j W_j $(1 \leq j \leq B)$

After that, the sample grader calls the function `graph`, and outputs the answer in the final line.

Example

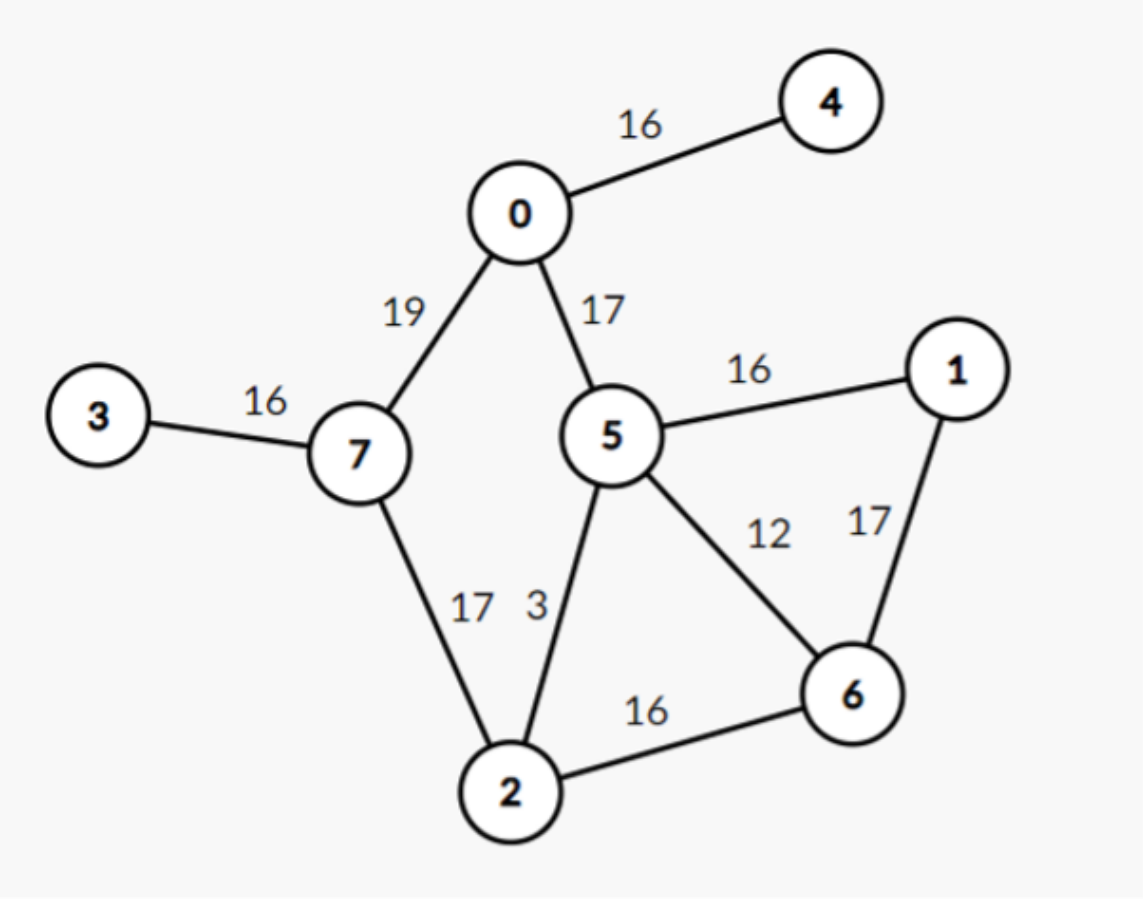
Let's consider the following example: $N = 8$, $A = 2$, $B = 3$.
The operations on the graph are the following:
$A_0 = \{4, 16\}$
$A_1 = \{5, 17\}$

The initial edges on the graph are the following:
$B_0 = \{2, 5, 3\}$
$B_1 = \{0, 7, 19\}$
$B_2 = \{5, 6, 12\}$

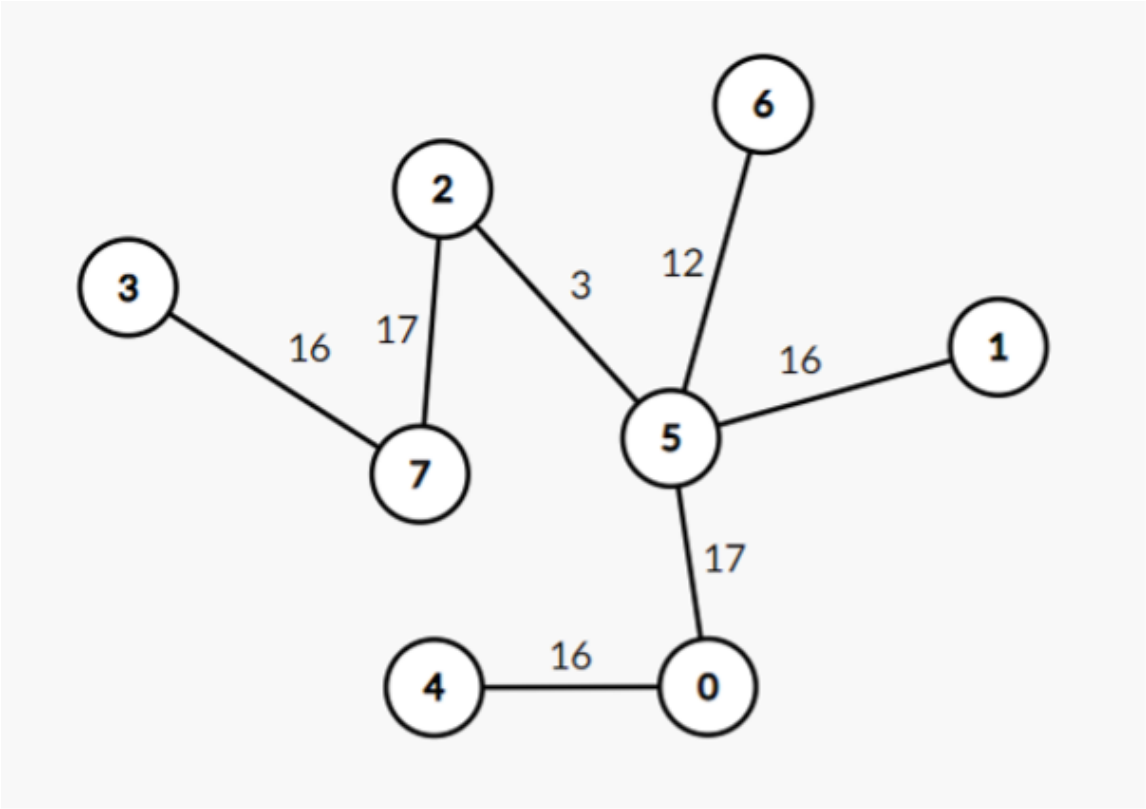
The following call is made:

```
graph(8, 2, 3, {2, 0, 7}, {5, 7, 6}, {3, 19, 12}, {4, 5}, {16, 16})
```

The graph has the following structure:



One of the possible minimal spanning trees is:



Thus the answer for the example is: 97