Problem K. Keep on the Right Track

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	512 megabytes

You enjoy exploring the world by car. Today, you have arrived in a new country consisting of n cities, numbered 1 to n.

You wish to drive to the capital city, t. Unfortunately, the country's communication network is outdated, so your navigation system does not always have a signal. However, the road network forms a **weighted directed acyclic graph** where the weight of each edge represents the time required to traverse it, and every city has a path to the capital city t via the road network.

Upon arriving at any city other than t, you choose the next road according to the following rules:

- If there is a signal, the navigation system randomly selects one of the **shortest paths** from the current city to t with equal probability, and directs you to take the **first edge** of that path;
- If there is no signal, you randomly select one of the city's outgoing edges with equal probability.

Consequently, in cities with a signal, the probability of selecting a specific outgoing edge is proportional to the number of shortest paths that begin with that edge; the probabilities of selecting different outgoing edges are not necessarily equal. A new choice is made after traversing each edge to reach the next city. All random choices are independent, and the journey ends immediately upon reaching the capital city t.

You want to determine, for each starting city s, the expected total time required to reach the capital city t, modulo 998244353.

Input

The first line contains three integers $n,\ m,\ t$ ($1 \le t \le n \le 2 \times 10^5$, $0 \le m \le 4 \times 10^5$), representing the number of cities, the number of roads, and the ID of the capital city, respectively.

The second line contains a binary string of length n. The i-th character is 1 if city i has a signal, and 0 otherwise. The state of city t does not affect the solution to the problem.

The next m lines each contain three integers $u,\ v,\ w$ ($1 \le u, v \le n$, $u \ne v$, $1 \le w \le 10^9$), representing a road from u to v with a travel time of w.

The graph is guaranteed to be a directed acyclic graph; there is at most one directed edge between any pair of vertices; and t is the only vertex in the graph with no outgoing edges. The number of shortest paths from any vertex to t is not divisible by 998244353.

Output

Output n integers. The s-th integer represents the expected total travel time from city s to city t, modulo 998244353.

More precisely, if the expected value is expressed as an irreducible fraction p/q, output $p \cdot q^{-1} \bmod 998244353$, where q^{-1} is the modular multiplicative inverse of q. It is guaranteed that this inverse exists.

Examples

standard input	standard output
5 7 5 11011 1 2 1 1 3 1 2 5 2 2 4 1 4 5 1 3 5 2 3 4 2	166374062 2 499122179 1 0
4 5 2 1010 4 1 1 4 3 5 1 2 1 1 3 1 3 2 1	1 0 1 4

Note

In the first example, the three shortest paths from 1 to 5 are $1 \to 2 \to 5$, $1 \to 2 \to 4 \to 5$, and $1 \to 3 \to 5$. Therefore, at city 1, the navigation system directs you to city 2 with probability 2/3 and to city 3 with probability 1/3—**not** by choosing each with a probability of 1/2.

City 3 has no signal, so its two outgoing edges are chosen with equal probability. The expected remaining time to reach the destination from there is $(2 + 3)/2 = 5/2$; the expected time starting from city 2 is 2. Thus, the expected time starting from city 1 is $\frac{2}{3}(1+2)+\frac{1}{3}(1+\frac{5}{2}) = \frac{19}{6}$, which is 166374062 after modulo 998244353.

In the second example, the two outgoing edges from city 4 are chosen with equal probability. The navigation system resumes operation upon reaching city 1 or 3.