Problem N
Yet Another MST Problem

Time limit: 1 second
Memory limit: 1 GB

Problem Description

You are given a connected undirected graph G with N nodes and M edges. Each edge has weight 1.
Some nodes are marked, and the other nodes are unmarked. You are given a binary string S where $S_i = 1$ if and only if the node i is marked.

Let X be the set of all marked nodes. It is guaranteed that X is non-empty. Construct a complete weighted graph H on the subset X. The weight of the edge between u and v is $\texttt{dist}(u, v)^\dagger$, where the distance is measured in the original graph G.

Find the total sum of weights of a minimum spanning tree in H.

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† $\texttt{dist}(u, v)$ is the length of the shortest path between u and v. The length of a path is measured by the number of edges in the path.

Input Format

- The first line of input will contain a single integer T, denoting the number of test cases.
- Each test case consists of multiple lines of input:
  - The first line of each test case contains N and M - the number of nodes and the number of edges.
  - The second line contains a binary string S of size N.
  - Each of the next M lines contains 2 integers, u and v, representing an edge (u, v) in the graph G.

Output Format

For each test case, output on a new line the sum of weights of the minimum spanning tree of the constructed graph H.

Constraints

- $1 \le T \le 10^4$
- $2 \le N \le 2 \cdot 10^5$
- $(N - 1) \le M \le 2 \cdot 10^5$
- $S_i \in \{0, 1\}$
- $|S| = N$
- There exists at least one i such that $S_i = 1$
- $1 \le u, v \le N$
- $u \ne v$
- All the M pairs (u, v) are distinct.
- The given graph G is connected.
- The sum of N and the sum of M both do not exceed $2 \cdot 10^5$.

Samples

Sample Input 1

```
7
3 3
101
1 2
2 3
1 3
6 5
100101
1 2
2 3
3 4
3 5
5 6
4 3
0111
1 2
1 3
1 4
7 7
1110111
1 7
1 4
2 4
3 4
4 5
4 6
4 7
2 1
10
1 2
6 9
100111
2 5
4 3
3 5
5 1
1 6
4 2
4 5
6 3
2 3
6 8
110110
3 5
4 2
2 6
5 1
1 6
6 4
4 3
4 5
```

Sample Output 1

```
1
6
4
9
0
3
3
```

Sample Explanation

Test Case 1: There are 2 marked nodes 1 and 3. $\texttt{dist}(1, 3) = 1$ as there is a direct edge $(1, 3)$. Hence, the weight of the minimum spanning tree is simply 1.

Test Case 2: There are 3 marked nodes 1, 4, and 6. The weights of each edge are listed below:

- $\texttt{dist}(1, 4) = 3$
- $\texttt{dist}(1, 6) = 4$
- $\texttt{dist}(4, 6) = 3$

The minimum spanning tree contains the 1st and the 3rd edges. Hence, the sum of weights is 6.