Problem K. Vertex Covers

Time limit: 10 seconds

In graph theory, a vertex cover of a graph G is a set of vertices S such that each edge of the graph is incident to at least one vertex of the set. That is to say, for every edge (u, v) of the graph, either u or v is in the vertex cover S.

Now, Kamilah shows you an undirected graph G without loops or multiple edges, each vertex of which has a weight. She can evaluate a vertex cover S of G by the product of weights of all vertices belonging to S. Here, the product of an empty set (of numbers) is defined as 1.

You are asked to calculate the sum of the evaluations described above for all vertex covers of G.

Input

The input contains several test cases, and the first line is a positive integer T indicating the number of test cases which is up to 3600.

For each test case, the first line contains three integers n $(1 \le n \le 36)$ and m $(0 \le m \le \frac{n(n-1)}{2})$ which are the number of vertices and the number of edges in the graph G, and q $(10^8 \le q \le 10^9)$ which is a prime number for the output.

The second line contains n integers, the i-th of which is the weight of the i-th vertices in G. All weights are in the range of 1 to 10^9.

Each of the following m lines contains two integers u and v $(1 \le u, v \le n)$ describing an edge between the u-th vertex and the v-th one.

We guarantee that no more than 36 test cases satisfy $n > 18$.

Output

For each test case, output a line containing `Case #x: y`, where `x` is the test case number starting from 1, and `y` is the remainder of the answer divided by q.

Sample

standard input	standard output
2 4 3 998244353 1 1 1 1 1 2 2 3 3 4 4 6 998244353 1 1 1 1 1 2 1 3 1 4 2 3 2 4 3 4	Case #1: 8 Case #2: 5