



Problem E

Naomi with the Graph

As we know, Naomi is poor at math. But she practices math problems every day. The following problem is one which she met.

Naomi has a non-directed connected graph with n nodes, labeled from 1 to n , and m edges. The length of each edge is exactly 1. Each node in the graph has a special value and the value of the i -th node is denoted by $A[i]$. She defines $dist[i]$ as the length of the shortest path between the i -th node and the first node and especially $dist[1]=0$.

Then she defines the cost of the graph as $\sum_{i=1}^n (A[i] - dist[i])^2$.

Naomi wants to minimize the cost of the graph by inserting some new edges (the lengths of which should be 1 as well) into the graph. She can insert nothing or insert any number of new edges in her mind.

Can you help her?

Input

The input contains several test cases which is no more than 10.

In each test case, the first line contains two integers n and m ($1 \leq n \leq 40$, $0 \leq m \leq 1600$).

Each of the following m lines contains two integers x and y ($1 \leq x, y \leq n$) indicating an edge between the x -th node and the y -th node.

The last line of the test case contains n integers describing the array A and each element $A[i]$ satisfies $0 \leq A[i] \leq 1000$.

Output

For each test case, print the minimum cost of the graph in a single line.

Sample Input

Sample Output

| | |
|---------|---|
| 4 3 | 5 |
| 1 2 | |
| 2 3 | |
| 3 4 | |
| 0 3 3 3 | |