Problem I

National Disaster

Recently, Indinesia suffered from haze which is caused by smoke from the forest fire (similar to what's happened to its neighbouring country, Indonesia). The cause of the forest fire is still under investigation, but this disaster reduces the air quality and visibility by quite a lot. Indra, the president of Indinesia, is going to put a disaster recovery plan to mitigate the effect of this haze, but first, he ought to know how bad the visibility is.

He instructed his N ministers to spread out on a large vacant area, and then, each of them should report whether he can see all other ministers from his position, assuming each minister has a perfect eye sight. A minister (A) can see another minister (B) if and only if the distance between A and B is within the sight visibility. In other word, if the visibility is P meters, then each minister can see all other ministers who are within P meters (inclusive) in distance to him. Notice that only visibility determines whether A can see B; the position of any other minister has nothing to do with this.

However, not all the ministers are honest. In fact, some of them have ploy to disrupt the government by making false reports; their report may not coincide with the actual reality. This, of course, might hinder the plan and cause the projected budget to be not accurate. Indra, as a benevolence president, believes that most of his ministers are loyal and will not make any false reports intentionally. He needs your help to determine the minimum possible visibility by assuming the number of false reports is as minimal as possible.

Note that distance in this problem is calculated using Euclidean Distance, i.e. the distance between two points: (x_1, y_1) and (x_2, y_2), is equal to $\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$.

Input

The first line of input contains T (T ≤ 100) denoting the number of cases. Each case begins with an integer N (1 ≤ N ≤ 200) denoting the number of ministers. The second line of each case contains N integers X_i (0 ≤ X_i ≤ 30,000) representing the x-coordinate of each minister for i = 1.. N. The third line of each case contains N integer Y_i (0 ≤ Y_i ≤ 30,000) representing the y-coordinate of each minister for i = 1.. N. You may assume that no two ministers are located at the same position. The next N lines each contains N integers $L_{i,j}$ ($L_{i,j}$ ∈ {0, 1}; $L_{i,i}$ = 1). The ith row and jth column of L ($L_{i,j}$) denoting whether the ith minister states that he can see jth minister in the report. $L_{i,j}$ = 1 means he can see, otherwise, he cannot see.

Output

For each case, output "`Case #X: Y Z`" (without quotes) in a line where `X` is the case number (starts from 1), `Y` is the square value of visibility (assuming the number of false reports is minimized), and `Z` is the minimum number of false reports. If there is multiple possible `Y`, output the smallest one. Note that you should output the square value of the visibility for `Y` (to avoid precision problem), e.g., if the visibility is 4, then output 4^2 = 16 for `Y`.

Sample Input	Output for Sample Input
3 2 0 0 1 2 1 1 1 1 2 0 0 1 2 1 0 0 1 4 0 0 1 1 0 1 0 1 1 1 0 1 0 1 1 0 0 1 1 0 1 1 1 1	Case #1: 1 0 Case #2: 0 0 Case #3: 2 5

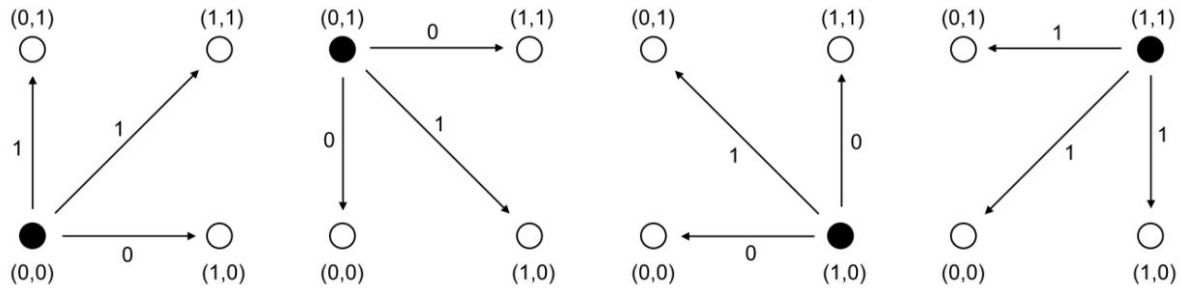
Explanation for 1st sample case

There are two ministers, each at (0, 1) and (0, 2). Their reports stated that they can see each other. Thus, the visibility is at least 1, while none of the reports are false. Note: $1^2 = 1$.

Explanation for 2nd sample case

The same situation as in 1st sample case, but in this case, their reports stated that they cannot see each other. If none of the reports are false, then the visibility could be 0. Note: $0^2 = 0$.

Explanation for 3rd sample case



1st minister's report 2nd minister's report 3rd minister's report 4th minister's report

In this case, the visibility should be $\sqrt{2}$ and 5 reports are false, i.e. {1, 3}, {2, 1}, {2, 4}, {3, 1}, and {3, 4}. Note: {A, B} means a report from A about B. If the visibility is 1, then there will be 9 reports which are false: the previous 5, {1, 4}, {2, 3}, {3, 2}, and {4, 1}. If the visibility is 0, then there will be 7 reports which are false: {1, 2}, {1, 4}, {2, 3}, {3, 2}, {4, 1}, {4, 2}, and {4, 3}. The square value of $\sqrt{2}$ is 2.