Problem E
Earth Crack

Time Limit: 6 seconds.

A geologist predicts that the next earth quake will cause an earth crack in a specific area of a seabed. The geologist also needs to predict where exactly the crack will most likely happen in the seabed area. He hypothesizes that different amounts of energy are required to cause a crack in different parts of the seabed area. In his calculation model, the seabed area is a large rectangular area consisting of **M** x **N** sub-regions, where **M** and **N** are the number of rows and columns, respectively. Each sub-region is associated with an estimated amount of energy required to cause a crack in it. The following figure illustrates an example of the calculation model where **M = 8** and **N = 5**. In the model, the first row corresponds to the north and the bottom row to the south.

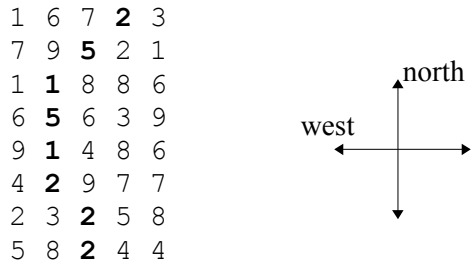

Figure 1. Example of earth-crack prediction model

The geologist further hypothesizes that cracks will occur from the northernmost to the southernmost of the seabed area. In addition, exactly one sub-region in each row will contain a crack and cracks in consecutive rows must be adjacent to each other, vertically or diagonally. This means that two adjacent cracks are either in the same column or in the adjacent column. The last part of the geologist's hypothesis is that the **most likely cracks** will occur in a way that the total amount of energy required to cause the cracks is minimal among all possible cracks. In the above example, the most likely cracks occur in the highlighted sub-regions and the total energy to cause the cracks is **2 + 5 + 1 + 5 + 1 + 2 + 2 + 2** units.

Your task is to write an efficient program to calculate the total energy amount required to cause the most likely cracks.

Input

The first line contains an integer **T** denoting the number of test cases (**1 <= T <= 10**). For each test case, the input is in the following format.

The first line contains integers **M** and **N** denoting the number of rows and columns of sub-regions in a seabed area, where **1 <= M <= 500** and **1 <= N<=500**.

The next **M** lines contain the amount of energy required to cause a crack in each sub-region. Each line represents a row where line **1 + i** represents the **i**-th row of the sub-regions. Note that the

first of these **M** line is line **1+1**, which represents the northernmost part of a seabed area. In addition, each line contains **N** integers denoting the amount of energy. These integers are separated by one or more space. The **j**-th column shows the amount of energy to cause a crack in the **j**-th sub-region of its represented row. The amounts of energy are positive integers not larger than 1,000,000.

Output

For each test case, your program writes one integer representing the total amount of energy required to cause the most likely crack in a test case. Each integer, including the last one, is followed by a new-line character.

Example

Input	**Output**
2 8 5 1 6 7 2 3 7 9 5 2 1 1 1 8 8 6 6 5 6 3 9 9 1 4 8 6 4 2 9 7 7 2 3 2 5 8 5 8 2 4 4 10 10 3 7 8 8 9 8 5 3 2 4 4 3 9 3 9 1 9 6 1 2 7 5 2 5 8 1 1 9 6 5 8 6 4 3 6 7 5 9 1 4 5 3 9 5 8 2 9 8 1 3 7 2 4 6 8 4 9 4 1 5 2 7 1 5 8 8 2 2 1 5 4 2 4 9 6 4 3 7 9 5 6 3 3 6 6 2 6 3 9 4 5 1 1 1 1 3 4 1 3 6	20 19

For your information, the following illustrates the most likely cracks in the second input case.

3 7 8 8 9 8 5 3 **2** 4
4 3 9 3 9 1 9 6 **1** 2
7 5 2 5 8 1 1 9 6 **5**
8 6 4 3 6 7 5 9 **1** 4
5 3 9 5 8 2 9 8 **1** 3
7 2 4 6 8 4 9 4 **1** 5
2 7 1 5 8 8 2 **2** 1 5
4 2 4 9 6 4 **3** 7 9 5
6 3 3 6 6 **2** 6 3 9 4
5 1 1 1 **1** 3 4 1 3 6