Byte Communication Inc. (BYTECOM) is establishing its cellular network in Byteland. From the first month of their establishment they are expanding their network very aggressively. Every month they are constructing some transmission tower. They are considering the following policy while establishing their networks.

1.   BYTECOM have divided the Byteland into a logical hexagonal grid with N levels. Below is the example of a hexagonal grid with 4 levels.

```
                     __
                    /29\
                 __/28\__/30\__
                /27\__/14\__/31\
             __/26\__/13\__/15\__/32\__
            /26\  /13\  /15\  /32\
            \__/12\__/ 5\__/16\__/
            /25\  / 4\  / 6\  /33\
            \__/11\__/ 1\__/17\__/
            /24\__/ 3\__/ 7\__/34\
            \__/10\__/ 2\__/18\__/
            /23\  / 9\  /19\  /35\
            \__/22\__/ 8\__/36\__/
               \__/21\__/37\__/
                  \__/20\__/
                     \__/
```
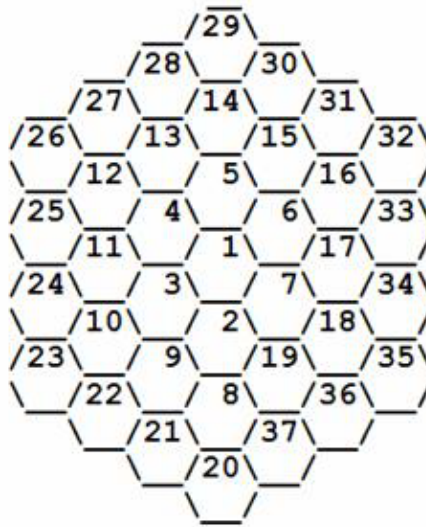
First level is the center and it contains only cell 1. The number of cells in subsequent levels is 6,12,18, .. 2nd level contains cells from 2 to 7, 3rd level contains cells from 8-19, 4th level contains cells from 20-37,   In each of the first the lowest cell is numbered. Then the rest of the cells are numbered in clockwise order.

2.   Each transmission tower covers exactly one cell. So they will not build multiple towers in the same cell.

3.   There are 3 types of lines.

·   The lines parallel to the connecting lines of the center of cell 1 and cell 2 is TYPE1 line. For example cell 14 and cell 29 are in the same TYPE1 line. Same for the cell pairs (4, 28), (32, 35), (23, 25) etc.

·   The lines parallel to the connecting lines of the center of cell 1 and cell 3 is TYPE2 line. For example cell 15 and cell 11 are in the same TYPE2 line. Same for the cell pairs (4, 31), (10, 32), (16, 23) etc.

·   The lines parallel to the connecting lines of the center of cell 1 and cell 4 is TYPE3 line. For example cell 13 and cell 17 are in the same TYPE3 line. Same for the cell pairs (5, 27), (10, 37), (16, 28) etc.

·   To clarify more there is not any other type of line. For example cell 3 and cell 5 is not in any type of line. Same for the cell pairs (4, 6), (12, 29) etc.

Every month BYTECOM will construct a number of cellular towers. But they have constraints for each the numbers of towers in each of the line type.

· Every month they can construct unlimited number of towers in each of the TYPE1 lines.

· Every month they can construct at most 2 towers in each of the TYPE2 lines.

· Every month they can construct at most 3 towers in each of the TYPE3 lines.

4. Initially the construction cost of a tower in cell i is C_i units of money. But because of inflation it will increase by 1 unit of money every month. For example if C_5 is 10 then construction of a tower in cell 5 is 10 units of money in first month, 11 units of money in second month, 12 units of money in third months and so on.

5. On month i BYTECOM will construct M_i number of towers with following the policy above. Their plan is to minimize the cost of construction of these M_i towers. In each month they just want to minimize the cost of that month, they don t care for the following months.

Now given information of the cells and the monthly plans, help BYTECOM to minimize the cost of tower construction for each of the months.

Input

Input contains multiple numbers of test cases. First line contains T($1 \leq T \leq 10$) the number of test cases. Each test case consists of 3 lines. First line contains n($2 \leq n \leq 20$) and m($1 \leq m \leq 10$). n is the number of levels in cellular grid and m is the number of months for which BYTECOM is constructing cellular towers. Second line contains $3n^2-3n+1$ integers (the total number of cells) .The i th integer is C_i ($1 \leq C_i \leq 1000$) denoting the cost of construction of a tower in cell i at first month. Third line contains m integers. The i th integer is M_i ($1 \leq M_i \leq 50$) denoting the number of towers that need to be constructed on i th month.

Output

For each test case output contains M+2 lines. First line is Case i: where i the number of test case. Each of the next M lines contains the cost for the i th month in the following format.

  Month i: c unit of money

Where c is the minimum construction cost for M_i towers in month i.

Also the input guarantee that for every month the set of M_i cells where building M_i towers costs c amount of money will be unique. No other set of unused cells will cost c or less amount of money in that month. An unused cell is the one where no tower has been built yet.

Also it will be always possible to build M_i number of towers in i th month.

The last line is blank.

See the output for sample input for details.

Sample Input

Output for Sample Input

Sample Input	Output for Sample Input
3	Case 1:
2 2	Month 1: 28 unit of money
3 4 3 7 6 7 5	Month 2: 8 unit of money
6 1	
3 2	Case 2:
9 9 9 3 3 10 13 6 11 11 5 13 11 7 5 12 4 6 9	Month 1: 67 unit of money
10 8	Month 2: 85 unit of money
3 3	
9 10 5 5 10 6 4 4 3 5 5 7 8 10 12 6 9 5 3	Case 3:
10 8 1	Month 1: 49 unit of money
	Month 2: 76 unit of money
	Month 3: 11 unit of money

Problem setter: Abdullah al Mahmud, Special Thanks: Rujia Liu, M. M. Rahman

Dhaka 2008-2009