

Task 4

# River crossing

## Task

In a river, people are playing a slightly dangerous game. They cross the river from one side to the opposite side by jumping on the stones.

|               |       | Column                   |                          |                          |                          |
|---------------|-------|--------------------------|--------------------------|--------------------------|--------------------------|
| Opposite side |       | 1                        | 2                        | 3                        | 4                        |
| River         | Row 5 |                          |                          |                          | <input type="checkbox"/> |
|               | Row 4 |                          | <input type="checkbox"/> |                          |                          |
|               | Row 3 | <input type="checkbox"/> |                          |                          |                          |
|               | Row 2 |                          |                          | <input type="checkbox"/> |                          |
|               | Row 1 | <input type="checkbox"/> | <input type="checkbox"/> |                          |                          |
| Starting side |       |                          |                          |                          |                          |

Figure 4-1 An example of positions of stones

As in Figure 4-1, we consider the stones exist on squares. The number of rows is  $n$ . In Figure 4-1,  $n = 5$ .

In this game, people cross the river from one side to the opposite side by ordinary jumps or skipping jumps. The number of skipping jumps is less than or equal to  $m$ . By an ordinary jump, they move to a stone or the side in the next row. By a skipping jump, they move to a stone or the side in the row after the next row. The next row of the starting side is the first row, and the next row of the first row is the second row. The row after the next row to the  $(n - 1)$ -st row is the opposite side. Also, the next row to the  $n$ -th row is the opposite side.

In order to play this game safely, we consider the *dangerousness* of jumps. Each stone has *slipperiness*. The dangerousness of a jump from one stone to another is

$$(\text{Slipperiness of the current stone} + \text{Slipperiness of the next stone}) \times (\text{Horizontal distance})$$

regardless of whether it is an ordinary jump or a skipping jump. The horizontal distance is the difference of the columns of the two stones. The dangerousness of a jump from the starting side to a stone is zero. Also, the dangerousness of a jump from a stone to the opposite side is zero.

Write a program which, when  $n, m$  and the position and the slipperiness of each stone are given, calculates the minimum of the sum of dangerousness of jumps when people move from the starting side to the opposite side. In given inputs, people can move to the opposite side. The number of stones in each square is less than or equal to one.

## Input

The input file is named `input.txt`.

The first line contains two space-separated integers  $n, m$ . Here  $n$  denotes the number of rows. The number of skipping jumps in this game is less than or equal to  $m$ . These numbers satisfy  $2 \leq n \leq 150$ ,  $0 \leq m \leq \frac{(n+1)}{2}$ .

The following  $n$  lines contain information of the stones. The  $(i + 1)$ -st ( $1 \leq i \leq n$ ) line contains  $1 + 2 \times k_i$  space-separated integers: a integer  $k_i$  ( $1 \leq k_i \leq 10$ ) and  $2 \times k_i$  integers. These numbers express information of the stones in the  $i$ -th row.

$k_i$  is the number of stones in that row. The meaning of the following  $2 \times k_i$  integers is as follows:  $(2 \times j - 1)$ -st ( $1 \leq j \leq k_i$ ) integer  $x_{i,j}$  is the column of the  $j$ -th stone in that row, and  $(2 \times j)$ -th integer  $d_{i,j}$  is the slipperiness of the  $j$ -th stone in that row.  $x_{i,j}, d_{i,j}$  satisfy  $1 \leq x_{i,j}, d_{i,j} \leq 1000$ .

Among the data used for evaluation, 20% of the mark is given for test cases satisfying  $n \leq 6$ , and another 20% of the mark is given for test cases satisfying  $m = 0$ .

## Output

The output file is named `output.txt`.

The file should consist of one line, and the line should contain the minimum of the sum of dangerousness of jumps when people move from the starting side to the opposite side.

## Example

In Figure 4-2, the number written on a stone denotes its slipperiness. If they cross the river by following the arrow, the dangerousness of jumps are  $0$ ,  $(2 + 2) \times 1 = 4$ ,  $(2 + 1) \times 1 = 3$ ,  $(1 + 4) \times 2 = 10$ ,  $0$ , respectively. The sum is  $17$ . It is the minimum of the sum of the dangerousness of jumps.

It corresponds to Example 1 in Sample inputs and outputs.

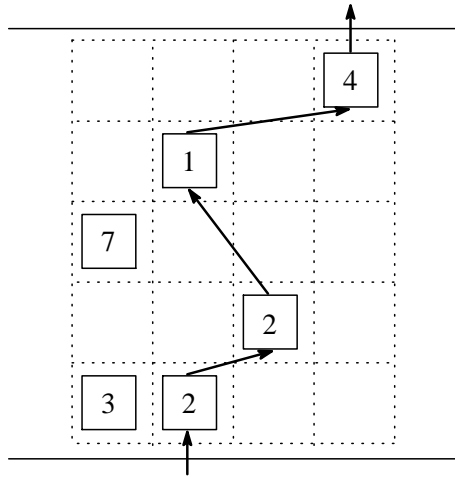


Figure 4-2

## Sample inputs and outputs

The above example corresponds to Example 1.

### Example 1

input.txt

```
5 1
2 1 3 2 2
1 3 2
1 1 7
1 2 1
1 4 4
```

output.txt

```
17
```

### Example 2

input.txt

```
5 0
2 1 3 2 2
1 3 2
1 1 7
1 2 1
1 4 4
```

output.txt

```
40
```