

F: Flow Shop

Sean's Swathers makes custom swathers (equipment used to harvest grain). All swathers go through the same basic stages in their construction: for example they all need to have a cutting bar, a grain belt, and a reel fitted. However, these components can be customized based on the buyer's needs, so these various stages may take different amounts of time between different swathers.

In particular, n swathers have been ordered and there are m stages in the manufacturing process. The swathers will each go through the same sequence of stages. In particular, the processing occurs as follows. For each swather j and each stage i , it takes $p_{j,i}$ units of time to complete stage i for swather j . The workers at each stage may only work on one swather at a time. At the start of the day all swather orders are ready to be processed by the first stage. At any point in the process, if the workers at stage i are idle and there are swathers waiting to be processed at this stage, then the workers will pick the swather that has the lowest label (they are labelled from 1 to n). Determine the time each swather is completed.

Input

Input may consist of multiple cases. A case begins with a single line containing n and m ($1 \leq n, m \leq 1000$), representing the number of swathers and stages (respectively). Following this are n lines, each with m integers. The i th integer of the j th line is $p_{j,i}$, giving the amount of time it will take for the workers at stage i to complete swather j ($1 \leq p_{j,i} \leq 10$). The last case is followed by a line containing 0 0 (zeroes). There may be blank lines for readability.

Output

For each case, display the case number followed by a single line containing n integers $c_1 c_2 \dots c_n$ with a single space between consecutive integers. These should be such that stage m for swather j is completed at time c_j . Format as in the sample.

Sample Input

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2 3
1 2 3
3 2 1
```

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3 2
3 1
4 7
2 5
```

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0 0
```

Sample Output

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Case 1: 6 7
Case 2: 4 14 19
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