

Exercise one

1. (Display pyramid) (30 Points) Write a program that prompts the user to enter an integer from 1 to 15 and displays a pyramid, as shown in the following sample run:

Enter the Number of lines: 7

```

      1
    2 1 2
  3 2 1 2 3
4 3 2 1 2 3 4
5 4 3 2 1 2 3 4 5
6 5 4 3 2 1 2 3 4 5 6
7 6 5 4 3 2 1 2 3 4 5 6 7
```

2. (Reverse Words in a String) (30 Points) Given a string, you need to write a program to reverse the order of characters in each word within a sentence while still preserving whitespace and initial word order.

Example:

Input: "Let's take LeetCode contest"

Output: "s'teL ekat edoCteeL tsetnoc"

3. (Computer Pi) (40 Points) You can approximate Pi by using the following series:

$$\text{Pi} = 4\left(1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \frac{1}{11} + \dots + \frac{(-1)^{i+1}}{2i-1}\right)$$

Write a program that displays the Pi value for $i = 10000, 20000, \dots$, and 100000.

4. (What a Simple Research) (Bonus Question: 20 Points) Doctor Li is doing some research on Chinese ancient music. Many Chinese ancient music has only five kinds of tones, which can be denoted by 'C', 'D', 'E', 'G', and 'A'. Given a piece of music score, Li wants to do some simple statistics.

Input

There are no more than 20 test cases.

In each test case:

The first line contains two integers n and m ($2 \leq n, m \leq 20$), indicating that a piece of music score is represented by an $n \times m$ matrix of tones. Only 'C', 'D', 'E', 'G',

and 'A' can appear in the matrix.
Then the $n \times m$ matrix follows.
The input ends with a line of '0 0'.

Output

For each test case:

For each kind of tone shown in the matrix, calculate the appearing times of it, and print the result in descending order according to the appearing times. If more than one kind of tones has the same appearing times, print them in the lexicographical order.

Sample Input

```
4 5
AGCDE
AGDDE
DDDDD
EEEE
2 4
GADC
CDEE
0 0
```

Sample Output

```
D 8 E 7 A 2 G 2 C 1
C 2 D 2 E 2 A 1 G 1
```