TK1114 Computer Programming

Lab 7

Array & Array Processing II

Problem Solving

15 – 17 November 2016

Name : _____

Matric Number : _____

7A	MULTIPLE CHOICE	
	Input	Standard input
	Output	Standard output
	Topic	2D Array : problem solving

Problem Description

Multiple choice is a form of an objective assessment in which students are asked to select the only correct answer out of the choices from a list. Multiple choice testing increased in popularity in the mid-20th century when scanners and data-processing machines were developed to check the results. (Wiki)

Your task is to write a program that grades multiple choice tests. Suppose there are nine students and ten multiple choice questions, and the answers are stored in a two-dimensional array. Each row records a student's answer to the questions.

For example, the following array stores the students' answers to the test.

	0	1	2	3	4	5	6	7	8	9
Student 0	A	B	A	C	C	D	E	E	A	D
Student 1	D	B	A	B	C	A	E	E	A	D
Student 2	E	D	D	A	C	B	E	E	A	D
Student 3	C	B	A	E	D	C	E	E	A	D
Student 4	A	B	D	C	C	D	E	E	A	D
Student 5	B	B	E	C	C	D	E	E	A	D
Student 6	B	B	A	C	C	D	E	E	A	D
Student 7	E	B	E	C	C	D	E	E	A	D
Student 8	D	B	D	C	C	D	E	E	A	D

The key (correct answer) is stored in a one-dimensional array, as follows:

	0	1	2	3	4	5	6	7	8	9
key	D	B	D	C	C	D	A	E	A	D

Assuming that 1 mark is given to a correct answer and 0.25 marks is subtracted for each wrong answer, the result for the above test is as follow:

Student 0: 6.25
Student 1: 5.00
Student 2: 3.75
Student 3: 2.50
Student 4: 7.50
Student 5: 6.25
Student 6: 6.25
Student 7: 6.25
Student 8: 8.75

Input

The input consists of a few test cases. For each test case, the first line of input is a positive integer N ($N \leq 100$) which indicates the number of students taking the test. On the next line is the key (correct) answer for the test. The length of the key answer is from 1 to 20, inclusive. The following N lines contains the answer for each student. Assume that all the student answer all question. Input is terminated by a test case where ***N*** is 0.

Output

For each test case, output a line in the format `"Case #x:"` where `x` is the case number (starting from 1), follow by the result for each student as shown in the sample output.
Note: Print all the marks in two decimal places.

Sample Input Output

Sample Input	Sample Output
9 DBDCCDAEAD ABACCDEEAD DBABCAEEAD EDDACBEEAD CBAEDCEEAD ABDCCDEEAD BBECCDEEAD BBACCDEEAD EBECCDEEAD DBDCCDEEAD 5 ABCDE DCEAE AADDE BEEAE CBDBD DECBD 0	Case #1: Student 0: 6.25 Student 1: 5.00 Student 2: 3.75 Student 3: 2.50 Student 4: 7.50 Student 5: 6.25 Student 6: 6.25 Student 7: 6.25 Student 8: 8.75 Case #2: Student 0: 0.00 Student 1: 2.50 Student 2: 0.00 Student 3: 0.00 Student 4: 0.00

7B	ZERO *SIFAR* ROWS	
	Input	Standard input
	Output	Standard output
	Topic	2D Array : simple problem solving

Problem Description

Assume you are given a checker board of size ***N***x***N*** which is filled with 0s and 1s. Your task is to find the row(s) with all zeros.

For example, the following board of size 8x8, has all zeros in row 2 and 8.

```
1 0 1 0 1 0 0 0
0 0 0 0 0 0 0 0
1 1 1 1 0 0 1 1
1 0 1 0 0 0 0 1
1 1 1 0 0 1 1 1
1 0 0 0 0 0 0 1
1 0 0 1 1 0 0 1
0 0 0 0 0 0 0 0
```

Input

The input consists of a few test cases. For each test case, the first line of input is a positive integer ***N*** (***N*** ≤ 24) which indicates the size of the board. The following ***N*** lines contains the the data with ***N*** number of 0 / 1in each line.

Output

For each test case, the output contains a line in the format "`Case #x:`", where x is the case number (starting from 1). The following line(s) contains the row number with all the elements are zero, each in separate line. If there is no such row, print "`none`".

Sample Input Output

Sample Input	Sample Output
8 1 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 0 0 1 1 1 0 1 0 0 0 0 1 1 1 1 0 0 1 1 1 1 0 0 0 0 0 0 1 1 0 0 1 1 0 0 1 0 0 0 0 0 0 0 0 4 1 1 1 1 1 0 0 1 1 0 0 1 1 1 1 1 0	Case #1: row 2 row 8 Case #2: none

7C	SELF STUDY	
	Input	Standard input
	Output	Standard output
	Topic	2D Array : problem solving

Problem Description

Students are required to spend at least 25 hours weekly for self-study on Programming I course. The weekly hours that students spend on self-study are stored in a two-dimensional array. Each row consists of seven columns, stores a student's daily study hours.

For example, the following array stores self-study hours for 8 students.

	Su	M	T	W	T	F	Sa
Student 0	2	4	3	4	5	8	8
Student 1	7	3	4	3	3	4	4
Student 2	3	3	0	3	3	2	2
Student 3	9	3	4	7	3	4	1
Student 4	3	5	4	3	6	3	8
Student 5	3	4	1	2	3	4	4
Student 6	3	7	4	8	3	8	4
Student 7	6	3	5	9	2	7	9

Your program should be able to read the data and display total study hours for each student and calculate percentage of student who study more than 25 hours per week.

Input

The input consists of a few test cases. For each test case, the first line of input is a positive integer N ($N \leq 100$) which indicates the number of students in the test case. Each of the following N lines contains 7 integers represent daily study hours for the student. Input is terminated by a test case where N is 0.

Output

For each test case, output a line in the format "`Case #x: p%`" where `x` is the case number (starting from 1), follow by the percentage of student who studies more than 25 hours per week. The following N lines are the total study hours for each student, as shown in the sample output.
Note: Print `p` in two decimal places

Sample Input Output

Sample Input	Sample Output
8 2 4 3 4 5 8 8 7 3 4 3 3 4 4 3 3 0 3 3 2 2 9 3 4 7 3 4 1 3 5 4 3 6 3 8 3 4 1 2 3 4 4 3 7 4 8 3 8 4 6 3 5 9 2 7 9 5 5 4 2 3 2 5 1 4 3 2 5 1 7 2 2 1 6 5 7 3 8 1 8 4 3 7 5 2 7 5 8 1 9 3 6 0	Case #1: 75.00% Student 0: 34 Student 1: 28 Student 2: 16 Student 3: 31 Student 4: 32 Student 5: 21 Student 6: 37 Student 7: 41 Case #2: 60.00% Student 0: 22 Student 1: 24 Student 2: 32 Student 3: 30 Student 4: 39

7D	ONE *SATU* COLUMNS	
	Input	Standard input
	Output	Standard output
	Topic	2D Array : simple problem solving

Problem Description

Assume you are given a checker board of size ***N***x***N*** which is filled with 0s and 1s. Your task is to find the columns(s) with all ones.

For example, the following board of size 8x8, has all ones in column 1 and 7.

Input

The input consists of a few test cases. For each test case, the first line of input is a positive integer ***N*** (***N*** ≤ 24) which indicates the size of the board. The following ***N*** lines contains the the data with ***N*** number of 0 / 1in each line.

Output

For each test case, the output contains a line in the format "`Case #x:`", where x is the case number (starting from 1). The following line(s) contains the column number with all the elements are one, each in separate line. If there is no such row, print "`none`".

Sample Input Output

Sample Input	Sample Output
8 1 0 1 0 1 0 1 0 1 0 0 0 0 0 1 0 1 1 1 1 0 0 1 1 1 0 1 0 0 0 1 1 1 1 1 0 0 1 1 1 1 0 0 0 0 0 1 1 1 0 0 1 1 0 1 1 1 0 0 0 0 0 1 0 4 0 0 0 0 0 1 1 0 0 1 1 0 0 0 0 0 0	Case #1: column 1 column 7 Case #2: none

7E	RAIN KEEPS FALLING	
	Input	Standard input
	Output	Standard output
	Topic	2D Array : problem solving

Problem Description

Meteorologists have recorded monthly rainfall amounts at several sites throughout the country.
For example, the following data represents monthly rainfall for year 2008 – 2012 at an area in our country.

Year	1	2	3	4	5	6	7	8	9	10	11	12
2008	3.19	7.44	3.82	7.42	3.99	7.03	2.41	8.17	5.30	10.21	17.82	16.27
2009	4.93	0.75	1.16	3.09	4.53	2.52	7.89	3.74	5.80	3.93	33.19	17.31
2010	4.05	0.47	0.73	2.47	1.00	6.67	3.00	1.06	2.41	10.65	14.17	15.17
2011	15.84	1.80	8.09	1.32	0.43	8.60	6.50	4.29	4.00	10.66	21.43	12.97
2012	8.88	0.17	3.74	2.35	6.65	1.89	3.39	2.21	6.41	2.63	2.93	26.58

Your task is to write a program that reads several years' rainfall amounts from a site and calculate the average, lowest and highest rainfall for each year. If there is more than one month with lowest and highest value, print the latest month for the year.

Input

The input consists of a few test cases. For each test case, on the first line of input there is 2 positive integers that represent the start year (x) and the end year (y) of the rainfall data. The following number of lines contains 12 integers representing the monthly rainfall for the year. Input is terminated by a line with two 0s.

Output

For each test case, output a line in the format `"Case #x:"` where `x` is the case number (starting from 1). In the following lines print the year and the average, lowest and highest rainfall for the year, as shown in the sample output.

Note:

a) Print the average in 2 decimal places.
b) Use the following month names:

```
Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec.
```

Sample Input Output

Sample Input

```
2008 2010
3.19 7.44 3.82 7.42 3.99 7.03 2.41 8.17 5.30 10.21 17.82 16.27
4.93 0.75 1.16 3.09 4.53 2.52 7.89 3.74 5.80 3.93 33.19 17.31
4.05 0.47 0.73 2.47 1.00 6.67 3.00 1.06 2.41 10.65 14.17 15.17
2011 2012
15.84 1.80 8.09 1.32 0.43 8.60 6.50 4.29 4.00 10.66 21.43 12.97
8.88 0.17 3.74 2.35 6.65 1.89 3.39 2.21 6.41 2.63 2.93 26.58
0 0
```

Sample Output

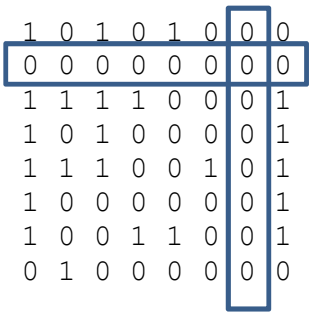
```
Case #1:
Year 2008: Avg: 7.76 Lo: Jul Hi: Nov
Year 2009: Avg: 7.40 Lo: Feb Hi: Nov
Year 2010: Avg: 5.15 Lo: Feb Hi: Dec
Case #2:
Year 2011: Avg: 7.99 Lo: May Hi: Nov
Year 2012: Avg: 5.65 Lo: Feb Hi: Dec
```

7F	ZERO ROWS & COLS	
	Input	Standard input
	Output	Standard output
	Topic	2D Array : simple problem solving

Problem Description

Assume you are given a checker board of size ***N***x***N*** which is filled with 0s and 1s. Your task is to find the row(s) and column(s) with all zeros.

For example, the following board of size 8x8, has all zeros in row 2 and column 7.



Input

The input consists of a few test cases. For each test case, the first line of input is a positive integer ***N*** (***N*** ≤ 24) which indicates the size of the board. The following ***N*** lines contains the the data with ***N*** number of 0 / 1in each line.

Output

For each test case, the output contains a line in the format "`Case #x:`", where x is the case number (starting from 1). The following line(s) contains the row number with all the elements are zero, each in separate line. If there is no such row, print "`none`". This follows with line(s) contains the column number with all the elements are zero, each in separate line. If there is no such column, print "`none`".

Sample Input Output

Sample Input	Sample Output
8 1 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 1 1 1 1 0 0 0 1 1 0 1 0 0 0 0 1 1 1 1 0 0 1 0 1 1 0 0 0 0 0 0 1 1 0 0 1 1 0 0 1 0 1 0 0 0 0 0 0 4 1 1 1 1 1 1 0 1 1 0 0 1 1 1 1 1 0	Case #1: row 2 col 7 Case #2: none none