ACM-ICPC Live Archive

7789 Magical Mystery Knight's Tour

A knight's tour on a rectangular board of n rows and m columns of squares (traditionally 8-by-8) is a labelling of the squares by integers 1 through $n*m$ so that label $(n+1)$ is a knight's move from label n. That is, 2 squares horizontally and 1 square vertically or 1 square horizontally and 2 squares vertically. The left image below shows an 8-by-8 knight's tour.

1	56	13	26	3	46	15	28
24	37	2	57	14	27	4	47
55	12	25	38	45	58	29	16
36	23	64	61	42	39	48	5
11	54	41	44	59	62	17	30
22	35	60	63	40	43	6	49
53	10	33	20	51	8	31	18
34	21	52	9	32	19	50	7

1	48			33		63	18
30	51		3				
				15			
			45			36	
		25		9		21	60
				24	57	12	
	6			39			
54		42					

A knight's tour (on a square board) is (*semi*-)magical if the sum of the values in each row and column is the same (for the 8-by-8 case the sum would be 260). For this problem, you will be given a sequence of semi-magical 8-by-8 knight's tours with many of the labels removed (see the right image above). Write a program to fill in the missing labels so the knight's tour is *semi*-magical.

Input

The first line of input contains a single decimal integer P, $(1 \leq P \leq 10000)$, which is the number of data sets that follow. Each data set should be processed identically and independently.

Each data set consists of a multiple lines of input. The first line of each data set contains the data set number, K. This line is followed by 8 lines each containing 8 integers separated by spaces giving the labels for the corresponding row. If the label value is '`-1`', the label has been removed and your program is to find the correct value to put in that place.

Output

For each data set there are 9 lines of output. The first output line contains the data set number, K. The following 8 lines should contain 8 integers each, separated by spaces, filling in the removed values to give a complete semi-magical knight's tour which includes the positive labels from the input. There may be multiple correct answers. Your result will be graded correct if it is a semi-magical knight's tour and the positive labels from the input are in the same square in your answer.

Note: Your output does not have to be lined up as shown in the Sample Output below. Just make sure that each of the 8 lines of output for each data set has at least one space, but no more than two spaces between each value on the line.

Sample Input

```
1
1
1 48 -1 -1 33 -1 63 18
30 51 -1 3 -1 -1 -1 -1
-1 -1 -1 -1 15 -1 -1 -1
-1 -1 -1 45 -1 -1 36 -1
-1 -1 25 -1 9 -1 21 60
-1 -1 -1 -1 24 57 12 -1
-1 6 -1 -1 39 -1 -1 -1
54 -1 42 -1 -1 -1 -1 -1
```

Sample Output

```
1
 1 48 31 50 33 16 63 18
30 51 46  3 62 19 14 35
47  2 49 32 15 34 17 64
52 29  4 45 20 61 36 13
 5 44 25 56  9 40 21 60
28 53  8 41 24 57 12 37
43  6 55 26 39 10 59 22
54 27 42  7 58 23 38 11
```