



## G • 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 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

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 image below). Write a program to fill in the missing labels so the knight's tour is *semi*-magical.

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



### 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.

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

**Note:** Your output does not have to be lined up as shown in the Sample Output above. 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.