

## Assignment 8: Number Parade

A Number Parade puzzle is an  $n \times n$  matrix in which each cell is either empty or contains an integer in the range  $1 \dots n^2$ . The player's goal is to fill in the empty cells so that each of the integers in the range  $1 \dots n^2$  appears in the matrix and so that, for each  $k$ ,  $1 \leq k < n^2$ , the cells in which  $k$  and  $k + 1$  appear are adjacent to each other. Two cells are defined to be adjacent if they have a side in common. (Having only a corner in common is not sufficient.)

Here is an example of a correctly completed 6 x 6 Number Parade puzzle:

34	33	32	19	18	17
35	30	31	20	21	16
36	29	28	13	22	15
1	2	27	24	13	14
4	3	26	25	12	11
5	6	7	8	9	10

Develop a program that, given a completed Number Parade puzzle, reports whether it is correct. In the case that it is not, the program reports how many distinct values  $k$ , where  $1 \leq k < n^2$ , are such that  $k$  and  $k + 1$  do not appear in adjacent cells.

**Input:** The first line contains a positive integer  $end$  indicating how many completed Number Parade puzzles are to be evaluated. Each Number Parade puzzle is described by a line containing a single positive integer  $m$  followed by  $m$  lines each containing  $m$  positive integers.

**Output:** For each of the given Number Parade puzzles, a single line of output is to be generated.

- If the puzzle is correct, the program should print the word CORRECT.
- If the puzzle is not correct, the program should print INCORRECT: followed by a space, a count of how many cells are incorrect, and the values in the incorrect cells inside parentheses.

In the example below, the three values that do not appear in cells adjacent to their successors are 5, 9, and 21.

Sample Input

5				
1	2	5	7	8
10	3	4	6	9
11	12	13	14	15
25	22	20	19	16
24	23	21	18	17

Sample Output

INCORRECT: 3 (5, 9, 21)

Scoring Guidelines:

- +1 checks all numbers in the parade grid
- +2 checks appropriate adjacent numbers
- +1 excludes check when  $number = size^2$
- +2 prints CORRECT when appropriate
- +2 prints INCORRECT: with the number of incorrect items, and a list of incorrect numbers
- +1 code includes helpful, meaningful comments
- +1 variables and lists have clear, meaningful names.