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## 2. Python: Dominant Cells

ALL

There is a given list of lists of integers that represent a 2-dimensional grid with *n* rows and *m* columns. A cell is called a *dominant cell* if it has a strictly greater value than all of its neighbors. Two cells are neighbors when they share a common side or a common corner, so a cell can have up to 8 neighbors. Find the number of dominant cells in the grid.

1

**Function Description**

Complete the function *numCells* in the editor below.

2

*numCells* has the following parameter(s):

*int grid[n][m]:* a 2-dimensional array of integers

**Returns**

*int:* the number of dominant cells in the grid

**Constraints**

- $1 \le n, m \le 500$
- There are at least 2 cells in the grid.
- $1 \le grid[i][j] \le 100$

▼ **Input Format Format for Custom Testing**

Info Language: Python 3

Autocomplete Ready

```
30                          if(ii,kk)!=(i,k) and val<=grid[ii]
    [kk] :
31                              flag=0
32                              break
33                      if flag==0 :
34                          break
35                  else :
36                      res+=1
37      return res;
38  if __name__ == '__main__':
```

Line: 37 Col: 5

Test Results | Custom Input

Run Code | Run Tests | Submit

**Compiled successfully. All available test cases passed**

Test case 0

Test case 1

Test case 2

Input (stdin) Run as Custom Input |

```
1 3
2 3
3 1 2 7
```

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### ▼ Input Format Format for Custom Testing

Input from stdin will be processed as follows and passed to the function.

The first line contains an integer *n*, the number of rows in the grid.
The second line contains an integer *m*, the number of columns in the grid.
Next, *n* lines follow. The *i-th* of them contains *m* integers denoting the cells in the *i-th* row of the grid.

### ▼ Sample Case 0

**Sample Input 0**

```
STDIN       Function
-----       --------
3      →    n = 3
3      →    m = 3
1 2 7  →    grid = [[1, 2, 7], [4, 5, 6], [8, 8, 9]]
4 5 6
8 8 9
```

**Sample Output 0**

```
2
```

**Explanation 0**

There are 3 cells that have strictly greater values than all their neighboring cells. These

Info  Language: Python 3

Autocomplete Ready

```
30                          if(ii,kk)!=(i,k) and val<=grid[ii][kk] :
31                              flag=0
32                              break
33                      if flag==0 :
34                          break
35                  else :
36                      res+=1
37      return res;
38  if __name__ == '__main__':
```

Line: 37 Col: 5

Test Results | Custom Input

Run Code | Run Tests | Submit

**Compiled successfully. All available test cases passed**

- Test case 0
- Test case 1
- Test case 2

Input (stdin) | Run as Custom Input |

```
1  3
2  3
3  1 2 7
```

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**Explanation 0**

There are 3 cells that have strictly greater values than all their neighboring cells. These cells are:

- the bottom right value, 9, with neighbors of 5, 6 and 8
- the top right value, 7, with neighbors of 2, 5 and 6

Notice that the 8 at bottom left is not a dominant cell. It is not strictly greater than the cell to its right with a value of 8.

**▼ Sample Case 1**

**Sample Input 1**

```
1
4
1 2 2 1
```

**Sample Output 1**

```
0
```

**Explanation 1**

None of the cells is a dominant cell as each one has one neighbor with a greater or equal value.

**▼ Sample Case 2**

Info Language: Python 3

Autocomplete Ready

```
30                          if(ii,kk)!=(i,k) and val<=grid[ii]
    [kk] :
31                              flag=0
32                              break
33                      if flag==0 :
34                          break
35                  else :
36                      res+=1
37      return res;
38  if __name__ == '__main__':
```

Line: 37 Col: 5

Test Results | Custom Input

Run Code | Run Tests | Submit

**Compiled successfully. All available test cases passed**

Test case 0

Test case 1

Test case 2

Input (stdin) | Run as Custom Input |

```
1 3
2 3
3 1 2 7
```

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**Sample Output 1**

```
0
```

**Explanation 1**

None of the cells is a dominant cell as each one has one neighbor with a greater or equal value.

**▼ Sample Case 2**

**Sample Input 2**

```
4
3
9 1 1
1 1 9
9 1 1
1 1 9
```

**Sample Output 2**

```
4
```

**Explanation 2**

All cells with a value of 9 are dominant. Notice that for each of these cells, all its neighboring cells have value 1 which is strictly smaller than 9. None of the cells with value 1 is a dominant cell.

ALL

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Info Language: Python 3

Autocomplete Ready

```
30                          if(ii,kk)!=(i,k) and val<=grid[ii]
    [kk] :
31                              flag=0
32                              break
33                      if flag==0 :
34                          break
35                  else :
36                      res+=1
37      return res;
38  if __name__ == '__main__':
```

Line: 37 Col: 5

Test Results | Custom Input

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**Compiled successfully. All available test cases passed**

Test case 0

Test case 1

Test case 2

Input (stdin) | Run as Custom Input

```
1 3
2 3
3 1 2 7
```

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9 1
1 1

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Info Language: Python 3 Autocomplete Ready

```
1  #!/bin/python3...
10
11  #
12  # Complete the 'numCells' function below.
13  #
14  # The function is expected to return an INTEGER.
15  # The function accepts 2D_INTEGER_ARRAY grid as parameter.
16  #
17
18  def numCells(grid):
19      # Write your code here
20      print(grid_rows)
21      print(grid_columns)
22      print(grid)
23      res=0;
24      for i in range (len(grid)) :
25          for k in range(len(grid[0])) :
26              val=grid[i][k]
27              flag=1
28              for ii in range(max(0,i-1),min(len(grid),i+2)) :
29                  for kk in range(max(0,k-1),min(len(grid[0]),k+2)) :
30                      if(ii,kk)!=(i,k) and val<=grid[ii][kk] :
31                          flag=0
32                          break
33                  if flag==0 :
34                      break
35              else :
```

Test Results Custom Input Run Code Run Tests

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Info | Language: Python 3 | Autocomplete Ready

```
                    for kk in range(max(0,k-1),min(len(grid[0]),k+2)) :
                        if(ii,kk)!=(i,k) and val<=grid[ii][kk] :
                            flag=0
                            break
                    if flag==0 :
                        break
                else :
                    res+=1
    return res;
if __name__ == '__main__':
    fptr = open(os.environ['OUTPUT_PATH'], 'w')

    grid_rows = int(input().strip())
    grid_columns = int(input().strip())

    grid = []


    for _ in range(grid_rows):
        grid.append(list(map(int, input().rstrip().split())))

    result = numCells(grid)

    fptr.write(str(result) + '\n')

    fptr.close()
```

Line: 37 Col: 5

Test Results | Custom Input | Run Code | Run Tests | Submit

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Info Language: Python 3 Autocomplete Ready

```
15  # The function accepts 2D_INTEGER_ARRAY grid as parameter.
16  #
17
18  def numCells(grid):
19      # Write your code here
20      print(grid_rows)
21      print(grid_columns)
22      print(grid)
23      res=0;
24      for i in range (len(grid)) :
25          for k in range(len(grid[0])) :
26              val=grid[i][k]
27              flag=1
28              for ii in range(max(0,i-1),min(len(grid),i+2)):
29                  for kk in range(max(0,k-1),min(len(grid[0]),k+2)) :
30                      if(ii,kk)!=(i,k) and val<=grid[ii][kk] :
31                          flag=0
32                          break
33                  if flag==0 :
34                      break
35              else :
36                  res+=1
37      return res;
38  if __name__ == '__main__':
39      fptr = open(os.environ['OUTPUT_PATH'], 'w')
40
41      grid_rows = int(input().strip())
```

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# 1. Python: String Representations of Objects

ALL

Implement two vehicle classes:

Car:

- The constructor for Car must take two arguments. The first of them is its maximum speed, and the second one is a string that denotes the units in which the speed is given: either "km/h" or "mph".
- The class must be implemented to return a string based on the arguments. For example, if *car* is an object of class Car with a maximum speed of 120, and the unit is "km/h", then printing *car* prints the following string: "Car with the maximum speed of 120 km/h", without quotes. If the maximum speed is 94 and the unit is "mph", then printing *car* prints in the following string: "Car with the maximum speed of 94 mph", without quotes.

Boat:

- The constructor for Boat must take a single argument denoting its maximum speed in knots.
- The class must be implemented to return a string based on the argument. For example, if *boat* is an object of class Boat with a maximum speed of 82, then printing *boat* prints the following string: "Boat with the maximum speed of 82 knots", without quotes.

1

2

Info Python 3

Autocomplete Ready

```
1  #!/bin/python3 ...
10 class Car:
11     pass
12
13 class Boat:
14     pass
15
16 if __name__ == '__main__': ...
```

Test Results Custom Input

input000.txt

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ALL

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Boat:

- The constructor for Boat must take a single argument denoting its maximum speed in knots.
- The class must be implemented to return a string based on the argument. For example, if *boat* is an object of class Boat with a maximum speed of 82, then printing *boat* prints the following string: "Boat with the maximum speed of 82 knots", without quotes.

The implementations of the classes will be tested by a provided code stub on several input files. Each input file contains *several* queries, and each query constructs an object of one of the classes. It then prints the string representation of the object to the standard output.

**Constraints**

- 1 ≤ the number of queries in one test file ≤ 100

**▼ Input Format Format for Custom Testing**

In the first line, there is a single integer, *q*, the number of queries.

Then, *q* lines follow. In the $i^{th}$ of them, there are space-separated parameters. The first of them denotes the vehicle type to be constructed, and the remaining parameters denote the values passed for the constructor of the object.

**▼ Sample Case 0**

**Sample Input**

STDIN Function

Info Pyth

Autocomplet

```
1 > #!/b
10    class
11        p
12
13    class
14        pa
15
16 > if __n
```

Test Results

input000.txt

Type here to search

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ALL

1

2

▼ **Sample Case 0**

**Sample Input**

```
STDIN           Function
-----           -------
2               → number of queries, q = 2
car 151 km/h    → query parameters = ["car 151 km/h", "boat 77"]
boat 77
```

**Sample Output**

```
Car with the maximum speed of 151 km/h
Boat with the maximum speed of 77 knots
```

**Explanation**

There are 2 queries. In the first of them, an object of class Car with the maximum speed of 151 in km/h is constructed, and then its string representation is printed to the output. In the second query, an object of class Boat is constructed with the maximum speed of 77 knots, and then its string representation is printed to the output.

▼ **Sample Case 1**

**Sample Input**

```
STDIN           Function
-----           --------
3               → number of queries, q = 2
boat 101        → query parameters = ["boat 101", "car 120 mph", "car 251
km/h"]
car 120 mph
```

Info Pytho

Autocomplete

```
 1 > #!/bin
10   class
11       pa
12
13   class
14       pas
15
16 > if __na
```

Test Results

There are 2 queries. In the first of them, an object of class Car with the maximum speed of 151 in km/h is constructed, and then its string representation is printed to the output. In the second query, an object of class Boat is constructed with the maximum speed of 77 knots, and then its string representation is printed to the output.



### Sample Case 1

#### Sample Input

```
STDIN          Function
-----          --------
3              → number of queries, q = 2
boat 101       → query parameters = ["boat 101", "car 120 mph", "car 251
km/h"]
car 120 mph
car 251 km/h
```

#### Sample Output

```
Boat with the maximum speed of 101 knots
Car with the maximum speed of 120 mph
Car with the maximum speed of 251 km/h
```

#### Explanation

There are 3 queries. In the first of them, an object of class Boat with the maximum speed of 101 knots is constructed, and then its string representation is printed to the output. In the second query, an object of class Car with the maximum speed of 120 in mph is constructed, and then its string representation is printed to the output. In the third query, an object of class Car with the maximum speed of 251 in km/h is constructed, and then its string representation is printed to the output.

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lasses:

Car must take two
of them is its maximum
nd one is a string that
which the speed is
or "mph".

nplemented to return a
arguments. For example,
class Car with a
120, and the unit is
g *car* prints the following
maximum speed of
quotes. If the maximum
unit is "mph", then
the following string:
num speed of 94 mph",

Info | Python 3 | Autocomplete Ready

```
1  #!/bin/python3 ...
10
11 class Car:
12     pass
13
14 class Boat:
15     pass
16
17 if __name__ == '__main__':
18     fptr = open(os.environ['OUTPUT_PATH'], 'w')
19     q = int(input())
20     queries = []
21     for _ in range(q):
22         args = input().split()
23         vehicle_type, params = args[0], args[1:]
24         if vehicle_type == "car":
25             max_speed, speed_unit = int(params[0]), params[1]
26             vehicle = Car(max_speed, speed_unit)
27         elif vehicle_type == "boat":
28             max_speed = int(params[0])
29             vehicle = Boat(max_speed)
30         else:
31             raise ValueError("invalid vehicle type")
32         fptr.write("%s\n" % vehicle)
33     fptr.close()
34
```

Line: 10 Col: 1

Test Results | Custom Input | Run Code | Run Tests | Submit

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