CSC 131 - Introduction to Computer Science I
Lab 11

The purpose of this lab is to practice working with the **Array** and **Grid** data structures. You need to copy the modules **arrays.py** and **grid.py** into the folder that contains your solution for this lab.

Write Python program with the following functions:

- A function named **countNumbers** that generates 1000 random integers between 0 and 9 and displays the count for each number. Use an **array** of ten integers, say **counts**, to store the counts for the number of 0s, 1s, ..., 9s. The format of the output from this function should look as follows:

```
Number  Count
0       98
1       89
2       113
3       106
4       100
5       102
6       93
7       103
8       87
9       109
```

- A function named **shuffle** that accepts an **array** as a parameter and shuffles the elements in the array. You are not allowed to use Python's built-in shuffle function.
- A function **sumColumn(m, columnIndex)** that returns the sum of the elements in a specified column in a grid.

Use the following main function to test your code:

```
def main():
    print("Testing the countNumbers function")
    countNumbers()

    print("\nTesting the shuffle function")
    A = Array(10)
    for i in range(10):
        A[i] = randint(1,100)
    print("Original array:", A)
    shuffle(A)
    print("After shuffling:", A)

    print("\nTesting the sumColumn function")
    matrix = Grid(4,5,0)
    for r in range(matrix.getHeight()):
        for c in range(matrix.getWidth()):
            matrix[r][c] = int(str(r) + str(c))
    print("matrix is\n", matrix)

    print("\n%6s\t%3s" % ("Column", "Sum"))
    for column in range(matrix.getWidth()):
        print("%6d\t%3d"  % (column, sumColumn(matrix,column)))

main()
```

Sample output is as follows:

```
Testing the countNumbers function
Number  Count
0       100
1       105
2       101
3       97
4       108
5       86
6       85
7       119
8       97
9       102

Testing the shuffle function
Original array: [50, 47, 21, 95, 16, 4, 15, 11, 4, 1]
After shuffling: [15, 95, 50, 47, 1, 4, 21, 11, 16, 4]

Testing the sumColumn function
matrix is
0 1 2 3 4
10 11 12 13 14
20 21 22 23 24
30 31 32 33 34


Column  Sum
     0   60
     1   64
     2   68
     3   72
     4   76
```

Name your file lab11.py. Make sure to include your name and the name of your TRACE folder at the top of the file in a docstring. When you are done, demonstrate your code to the instructor and upload an electronic copy of your solution in your CSC131 upload folder in a folder called LABS\lab11.