CPS 210 Lab 11

1. (Count occurrence of numbers) Write a program that reads the integers between 1 and 100 and counts the occurrences of each. Assume the input ends with 0. HINT: Use an array. Here is a sample run of the program.

```
Enter the integers between 1 and 100: 2 5 6 5 4 3 23 43 2 0  ↵Enter
2 occurs 2 times
3 occurs 1 time
4 occurs 1 time
5 occurs 2 times
6 occurs 1 time
23 occurs 1 time
43 occurs 1 time
```

2. Write a method that takes in a double array and finds the maximum **value**.

    a. Write a method that takes in a double array and finds the **index** of the maximum value.

3. (Assign grades) Write a program that reads student scores, gets the best score, and then assigns grades based on the following scheme:

    Grade is A if score is $\geq$ best $-$ 10
    Grade is B if score is $\geq$ best $-$ 20;
    Grade is C if score is $\geq$ best $-$ 30;
    Grade is D if score is $\geq$ best $-$ 40;
    Grade is F otherwise.

The program prompts the user to enter the total number of students, then prompts the user to enter all of the scores, and concludes by displaying the grades. **HINT:** Use an array and loops. You will have to find the max grade in your array to get *best* (look at previous question…). Here is a sample run:

```
Enter the number of students: 4  ↵ Enter
Enter 4 scores: 40 55 70 58  ↵ Enter
Student 0 score is 40 and grade is C
Student 1 score is 55 and grade is B
Student 2 score is 70 and grade is A
Student 3 score is 58 and grade is B
```

4. Write a method that creates the pattern below. The method should take in a value of n to determine many rows the pattern goes. For example, the pattern below takes in 6 as the value.

```
Pattern A
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
1 2 3 4 5 6
```

5. Write a method that creates the pattern below. The method should take in a value of n to determine many rows the pattern goes. For example, the pattern below takes in 6 as the value.

Pattern B

```
1 2 3 4 5 6
1 2 3 4 5
1 2 3 4
1 2 3
1 2
1
```

6. Write a method that creates the pattern below. The method should take in a value of n to determine many rows the pattern goes. For example, the pattern below takes in 6 as the value.

- **HINT:** This one and 7 are a tad tricky. You will need an extra loop before the 1st inner loop to create each space (which is 2 spaces each loop or else the triangle looks wonky) before you print the number. How can you use the value of n and i to your advantage?

Pattern C

```
            1
          2 1
        3 2 1
      4 3 2 1
    5 4 3 2 1
  6 5 4 3 2 1
```

7. Write a method that creates the pattern below. The method should take in a value of n to determine many rows the pattern goes. For example, the pattern below takes in 6 as the value.

```
Pattern D
1 2 3 4 5 6
  1 2 3 4 5
    1 2 3 4
      1 2 3
        1 2
          1
```

8.

5.17 (*Display pyramid*) Write a program that prompts the user to enter an integer from 1 to **15 and displays a pyramid, as shown in the following sample run:

```
Enter the number of lines: 7  ⏎ Enter
                  1
                2 1 2
              3 2 1 2 3
            4 3 2 1 2 3 4
          5 4 3 2 1 2 3 4 5
        6 5 4 3 2 1 2 3 4 5 6
      7 6 5 4 3 2 1 2 3 4 5 6 7
```

-HINT: You can combine patterns and A and C in your loop to create the pattern.

9. Replicate the **body** of the exponents table below using nested loops. No need to include the header or sides unless you want to. Use Math.pow().

```
              Exponents Table
          0    1    2    3    4    5
      ----------------------------------
0 |       1    0    0    0    0    0
1 |       1    1    1    1    1    1
2 |       1    2    4    8   16   32
3 |       1    3    9   27   81  243
4 |       1    4   16   64  256 1024
5 |       1    5   25  125  625 3125
```

10. Create an account at https://leetcode.com/. Complete the following questions in LeetCode's text editor, not your own. If you completed the question correctly, you should be able to submit it on LeetCode without errors.

    a. https://leetcode.com/problems/build-array-from-permutation/

    b. https://leetcode.com/problems/concatenation-of-array/

    c. https://leetcode.com/problems/running-sum-of-1d-array/

    d. When you have time, try the other questions on Arrays. Remember, this is good practice for understanding Arrays as well as good practice for potential technical interviews. Be sure to check out the discussion tab to see how other programmers solved the problem: https://leetcode.com/tag/array/