Lab 12

Instructions: Complete the steps below. Be sure to upload a copy of all your source code (.java) files to the link on Brightspace by its deadline, so that you can receive credit for this lab.

1. BubbleSort.java: Write a bubbleSort method that uses the bubble-sort algorithm. The bubble-sort algorithm makes several passes through the array. On each pass, successive neighboring pairs are compared. If a pair is in decreasing order, its values are swapped; otherwise, the values remain unchanged. The technique is called a bubble sort or sinking sort because the smaller values gradually "bubble" their way to the top and the larger values sink to the bottom. The algorithm can be described as follows:

```
boolean changed = true;
     do {
        changed = false;
        for (int j = 0; j < list.length - 1; j++)
           if (list[j] > list[j + 1]) {
              swap list[j] with list[j + 1];
              changed = true;
           }
     } while (changed);
```

   Clearly, the list is in increasing order when the loop terminates. It is easy to show that the do loop executes at most list.length –1 times. Use the values [6.0, 4.4, 1.9, 2.9, 3.4, 2.9, 3.5] to test the method. Include your main method that tests your program.

2. Write a file `GPACalculator.java`, which contains the method `gpaCalculator(String[] grades)`. This method takes one parameter, an array of grades, and returns the floating-point average of the grades after converting each grade to a "grade point" in the range 0.0 through 4.0. For simplicity, we will assume that courses are 1 credit each. If the list of grades contains a grade not given in the table below, or the list of grades is empty, the function returns -1.0.

   A list of valid grades and their respective point values are given below:

Grade	**Grade Points**
A	4.0
B	3.0
C	2.0
D	1.0
F	0.0
P	Special case, see below
NC	Special case, see below

If a grade of P or NC is encountered in the list, the grade should simply be ignored and should not be factored into the GPA calculation.

Here are some sample runs:
gpaCalculator([“C”, “D”, “A”, “B”, “C”])
2.4
gpaCalculator([“D”, “A”, “P”, “C”, “A”])
2.75
gpaCalculator([“C”, “A”, “Z”])
-1.0
gpaCalculator([“A”, “NC”, “A”, “B”, “D”])
3.0
gpaCalculator([“P”, “NC”, “P”, “P”, “NC”])
0.0
gpaCalculator([“C-”, “A”, “B”])
-1.0
gpaCalculator([“P”, “A”, “NC”, “P”, “NC”, “P”, “B”])
3.5
gpaCalculator([])
-1.0
gpaCalculator([“B”])
3.0
gpaCalculator([“A”, “A”, “A”, “A”])
4.0

Grading Guidelines: This lab is graded on a scale of **0-3 points**, assigned as follows:

- **0 -** The student did not attend the lab,
- **3 -** The solutions are complete OR the student spent the entire lab solving the required lab problems (in this case, the students may not arrive at the lab after the lab started and may not leave until the lab ends).