Fundamental Structures Lab 07

(Due Date: 03/21/2016 4:30 pm)

Program 1 - Greatest Common Divisor (GCD) using recursion - 10 pts

1. Write a program that will read each line from **A1.txt**.
2. Show the GCD of the numbers in each line of the input file (using recursion) in a output file **B1.txt**.
3. Each line in **A1.txt** will correspond to each line of **B1.txt**.

Note: A single line of A1.txt may contain two/three integer numbers. First three lines are given as sample.

```
Sample Input
5 7
12 15
80 40 100

Sample Output Format:
1
3
20
```

Program 2 - Bubble Sort using recursion- 10 pts

1. Write a program that will read each line from **A2.txt** and store the numbers into an array.
2. Sort the numbers of that array using Bubble sort algorithm (using recursion).
3. Show the output in file **B2.txt**.

Note: In total there will be 10 lines in B2.txt, where each line will contain a sorted array. First two lines are given as sample. HINTS: Convert the outer loop as a recursion call. Inner loop will stay the same.

```
Sample input:
41 67 34 0 69 24 78 58 62 64 5 45 81 27 61
91 95 42 27 36 91 4 2 53 92 82 21 16 18 95

Sample output:
0 24 27 34 41 45 5 58 61 62 64 67 69 78 81
16 18 2 21 27 36 4 42 53 82 91 91 92 95 95
```

Program 3 - Binary Search using recursion- 15 pts

1. Write a program that will read each line from **A3.txt**.
2. Read the number in the first line, and search that number in the line next to it.
3. Use Binary search algorithm (using recursion) for searching.
4. So, each number in the odd lines(line 1, line 3, line 5, etc) will be searched in the even lines (line 2, line 4, line 6, etc) next to it respectively.
5. Show the positions where you found that number. If a number appears multiple times, show the last position in the input list.
6. Save your results in **B3.txt**.

Note: In C++, array index starts from 0 but the input file positions start from 1.

```
Sample input:
41
0 24 27 34 41 45 50 58 61 62 64 67 69 78 81
91
16 18 20 21 27 36 40 42 53 82 91 91 92 95 95
27
11 12 22 26 31 33 35 38 47 67 69 71 73 94 99

Sample output:
5
12
Not Found
```

Program 4 - Merge Sort - 15 pts

1. Write a program that will read each line from **A4.txt** and store the numbers into an array.
2. Sort the number of that array using Merge sort algorithm (using recursion).
3. Show the output in file **B4.txt**.

Note: In total there will be 15 lines in B4.txt, where each line will contain a sorted array. First two lines are given as sample.

```
Sample input:
41 53 97 67 62 82 93 54 34 11 62 29 16 96 61
95 25 62 75 90 18 51 41 54 94 7 96 5 17 95

Sample output:
11 16 29 34 41 53 54 61 62 62 67 82 93 96 97
5 7 17 18 25 41 51 54 62 75 90 94 95 95 96
```

Submission Example

Extraction of LastnameFirstnameLab01.zip

```
/Documents
    LastnameFirstnameLab01.zip
    /LastnameFirstnameLab01
        /prog1
            prog1.cpp
        /prog2
            prog2.cpp
            A2Output.txt
       /Bonus
           bonus.cpp
```

Important reminder: Minimum penalty of plagiarism is failing (F) grade in the course.