Indian Statistical Institute

Semester-I 2017-2018

M.Tech.(CS) - First Year

Lab Test I (10 August, 2017)

Subject: Data and File Structures Laboratory

Total: 50 marks Duration: 3 hrs.

SUBMISSION INSTRUCTIONS

1. Naming convention for your programs: `cs17xx-test1-progy.c`
2. When you have finished, copy all your files to `~dfslab/2017/labtest1/cs17xx/`.

1. You are given a text file named `student-info.txt` containing 30 lines. Each line is at most 80 characters long, and contains the following information about one student:

   - roll number: a string of the form cs17xx, where xx is a 2-digit number
   - attendance percentage: an integer between 0 and 100
   - aggregate percentage score: a floating point number between 0 and 100
   - name: 2 strings, separated by a space, corresponding to the first name and the last name of the student (the names consist only of uppercase and lowercase letters)

   Write a program to read the text file, and store the student information in an array of structures. Your program should then print the names of the students having the highest and lowest aggregate percentage scores in the following format.

   ```
   Student with highest aggregate percentage score: Mickey Mouse
   Student with lowest aggregate percentage score: Donald Duck
   ```

   [15]

2. Write a program that takes 2 strings `s` and `t` as command-line arguments, and prints `"YES"` if the strings are permutations of each other, and `"NO"` otherwise. You may assume that `s` and `t` consist of lowercase letters (a–z) only.

   Examples:

   ```
   $ ./prog1 carrot rotcar
   YES
   $ ./prog1 carrot tractor
   NO
   ```

   [15]

3. Recall that a polynomial of degree n in x is of the form:

   $$a_n x^n + a_{n-1} x^{n-1} + \ldots + a_1 x + a_0$$

   where $a_n \neq 0$. We can represent such a polynomial as a list of pairs, with each pair corresponding to the coefficient and exponent of a term. For compactness, we can omit terms with a cofficient of zero. For example, the polynomial $5x^7 + 9x^2 + 12x$ can be represented as

```
3
5 7
9 2
12 1
```

where the `3` on the first line specifies that the polynomial has 3 terms. **Also note that the terms are listed in decreasing order of their exponents.**

You are given a text file `poly.txt` that contains 2 polynomials one after the other, represented as given above. Write a program to compute and print the sum of these 2 polynomials. You should use the same convention used above when printing the output. For example, if your input file is

```
3
5 7
9 2
12 1
2
4 6
2 1
```

your program should print

```
4
5 7
4 6
9 2
14 1
```

[20]

4. [**Bonus problem**] Write a program that displays the hex dump of a file as shown in the example below. The value of each byte should be displayed as a pair of hexadecimal numbers. The name of the file and the number of bytes displayed per line should be taken as command line arguments.

   Example:

```
$ ./prog4 16 input.txt
20 2A 20 68 65 78 5F 63 68 61 72 28 63 68 61 72
20 2A 70 6F 73 69 74 69 6F 6E 2C 20 63 68 61 72
20 63 29 0A 20 20 20 7B 0A 20 20 20 73 70 72 69
6E 74 66 28 70 6F 73 69 74 69 6F 6E 2C 20 22 25
30 32 58 20 22 2C 20 63 29 3B 20 0A 0A 09 09 09
```

[15]