INDIAN STATISTICAL INSTITUTE

Laboratory Test II

M. Tech (CS) - I Year, 2015-2016 (Semester - I)

Data and File Structures Laboratory

Date: 14.08.2015 Total Marks: 150 + 20 = 170 (20 marks for good programming habits)

Note: Follow the file naming convention strictly as mentioned.

You are not allowed to connect and browse the internet during the test. No books and e-books are allowed. You can reuse your own code.

Any instance of malpractice would be dealt with sternly. If you are in doubt about whether your action is improper, better clarify.

(Q1) Write a C program (Name your program `labtest2-prob1-cs15XX.c` where `XX` is your roll number) that

(a) takes as input the name of a file as a string from the user. [5]

(b) opens the file, which has one word (string) per line, and reads the data. [10]

(c) puts the data into a two dimensional array formed using pointer to pointer; each row of the two dimensional array will contain a word (string) stored as a string of characters. [30]

(d) sorts the words stored in the two dimensional array in a lexicograhic order. [25]

(e) writes the sorted data back to a file; the name of the file should be taken as an input from the user. [10]

Total marks: [5+10+30+25+10=80]

(Q2) Write a C program (Name your program `labtest2-prob2-cs15XX.c` where `XX` is your roll number) that

(a) takes as input an integer n from the user, and subsequently reads-and-stores n points (x_1, y_1), (x_2, y_2), . . ., (x_n, y_n) from the user. [5]

(b) treats the aforesaid points as vertices of an n-sided polygon, in counter-clockwise order, and decide if the polygon is convex (i.e., if each internal angle is less than 180 degrees) [15]

(c) outputs the area of the polygon in case it is convex, and outputs -1 otherwise. [20]

Total marks: [5+15+20=40]

(a) The following shell program

`/home/backup/matlab/mtc14/pdslab/shell2/outputWords.sh`

takes a filename as the first command line argument, reads the file and outputs one word per line, each line numbered starting with 1.

Copy the directory `/home/backup/matlab/mtc14/pdslab/shell2` to your labtest2 directory using

```
cp -r /home/backup/matlab/mtc14/pdslab/shell2 ~/pdslab/labtest2
```

Now run the `find` command being in the directory and observe the output. The `find` command outputs each directory or file under the tree of the current working directory displaying its relative path, one per line.

```
cd ~/pdslab/labtest2
find ./shell2
```

Write a shell program `find-cs15XX.sh` (where XX is your roll number) **without using the `find` command** to perform the same action as `find` command does. Your shell program should take a directory as a command line argument and output all the files and directories under its tree, up to depth 2. Assume that each directory under the `shell2` directory can have only files (not directories) under it. You can use the `shell2` directory structure itself to test your program.

Total marks: [30]

Submission instruction: Submit all your source codes to the directory `labtest2` under the home directory of the user `pdslab`. For example, if you are copying a file `labtest2-prob1-cs15XX.c`, you should use the command

```
cp labtest2-prob1-cs15XX.c ~pdslab/labtest2/
```