CENG 301: Data Structures and Algorithms
Assignment 1
Fall 2013

Due date : 27.10.2013

General Rules

- You will submit you homework electronically using Ceng Homework Submission System (https://cow.ceng.metu.edu.tr).

  Login name : `e1234567` (your id)
  Password : `e1234567` (your id)

- Check your account and **change your password as soon as possible**. Otherwise your homework can be stolen, modified etc. This is your responsibility.Your homework must be named as "**Ceng301hw1_yourid.c**"

- Due date is **27.10.2013 23.55** and not subject to change.

- Late submission is allowed up to **31.10.2013** with a 10% deduction penalty per day.

- **Cheating Policy** : No teaming up is allowed. The homework has to be done individually. All students in this class are bounded by the Department of Computer Engineering Guidelines for Students of Honor Code of the Faculty of the Engineering, and we have zero tolerance to cheating.

- **"Before announcing your homework grades, we will invite some randomly chosen students to explain their codes. If invited students do not come to explain their work, or could not convince us that their submission is their own work they will get zero."**

- Write your name and ID at the very top of your code.

- Programs must be written in **C language** and be ANSI C compliant. Your codes will be tested on DevC++. If you are a UNIX user you can test your codes using gcc, otherwise use DevC++.

- If you encounter any problems while submitting your homework or any questions about homework, send an e-mail to myoldas@ceng.metu.edu.tr.

Assignment

In this homework, you are given a text file "scores.txt" which contains the scores of students taking the course.

Each line of this file contains StudentID, FirstName, LastName, Midterm, Final, Homework1, Homework2 and Homework3 information. Each line of the file will be kept in the following global structure:

```
typedef struct{
        char id[8];
        char fname[30];
        char lname[30];
        double midterm;
        double final;
        double hw1;
        double hw2;
        double hw3;
}Student;
```

There may be unknown number of student records in the "scores.txt" file.

Write a function **readInfo()** that will read the content of the input into an array of type Student.

Your program will take the following input arguments from the command line (**using argv[]**).
Consider the following percentages for the exams:

1. Midterm : 30 %
2. Final : 40 %
3. All homeworks: 30 %

Write a function named **studentScore()** that will calculate the score of each student in the input file according to:

*score = midterm*0.3 + final*0.4 + (hw1+hw2+hw3)/3*0.3*

```
double studentScore(double midterm, double final, double hw1, double hw2, double hw3 )
{
        .....
}
```

Write a function named **avgScore()** that will calculate the average score of all of the students in the input file.

```
double avgScore()
{
        .....
}
```

Write a function named **stdDev()** that will calculate standard deviation of each student in the input file with respect to:

$$stdDev = \sqrt{\frac{1}{N}(stdGrade_1 - avg)^2 + (stdGrade_2 - avg)^2 + ... + (stdGrade_n - avg)^2}$$

where *avg* is the average score of all students, *stdScore* values are the scores for each student in the input file and *N* is the number of students. StdDev() function has two parameters; average score of all students and number of students in the input file.

```
double stdDev(double avg, int numOfStudents)
{
        .......
}
```

Write a function named **courseGrade()** to calculate the scores and letter grades of students, the number of students whose scores are greater than 60, average score and standard deviation of the class. These values will be saved in an output file named "YourStudentID_allScores.txt". Ranges of letter grades are given in the table below.

90-100	AA
85-89	BA
80-84	BB
75-79	CB
70-74	CC
65-69	DC
60-64	DD
50-59	FD
0-49	FF

Sample run
$ceng301hw1_e1234567.out 30 40 30

Sample input file ("scores.txt")
1711245 Ahmet Yılmaz 80 90 90 85 95
1621464 Ayşe Güngör 76 84 60 74 100
1772356 Duygu Kaya 25 54 5 55 60
1882453 Murat Yalçın 40 76 80 85 90

Sample output file ("YourStudentID_allScores.txt" **)**
1711245 Ahmet Yılmaz 87 BA
1621464 Ayşe Güngör 79.8 CB
1772356 Duygu Kaya 41.1 FF
1882453 Murat Yalçın 67.9 DC
Average: 76.45
Standard Deviation: 4.75
(> 60) : 3