Object Oriented Programming

In this assignment, you are going to implement some classes which are integrated in a large system. You can see the files are in 00\_StudentWork. These classes are:

mySystem\_MonteCarlo

mySystem\_QuadraticFunction

mySystem\_CubicFunction

mySystem\_StudentManager

**Write in your program in .NET2010.**

**We will rebuild your program in the Release mode and check your program.**

Requirement Specification

Use double to define a variable which is a floating point number. All the calculations should be done in double precision. Don’t use float. Show the value of a floating point number up to 8 decimal digits.

1. **Basic tasks.**
2. **Write your name in the header file mySystem.h**
3. Press ‘s’ or ‘S’ to show your student information: student ID, name and email address. showStudentInfo( ) in mySystem.cpp

**Items I and II must be done. If not, your score is zero.**

Key usages:

F1: perform Monte Carlo Simulation

F2: perform Quadratic Function Calculation

F3: perform Cubic Function Calculation

F4: perform the student record management

i, I: ask for input

s, S: show the student information

**In mySystem\_MonteCarlo, implement the followings.**

1. Show a message about the Monte Carlo simulation.
2. Ask the user to input the radius of a circle.
3. Ask the user to input the number of samples. The maximum number of samples is between 2 and 1,000,000.
4. Use the Monte Carlo simulation to compute the pi value and show the pi value.
5. Get the radius.
6. Get the number of samples.
7. Get the coordinates of a sample based on the sample index (starting from 0). Return true if the sample lays inside the circle. Otherwise return false.

**In mySystem\_QuadraticFunction, implement the followings.**

1. Ask the user to input the three coefficients: a, b and c.
2. Ask the user to input the range of x, i.e., minimum value and maximum value of x. The minimum and maximum values should be in the interval [-10, 10].
3. Ask the user to input the number of sample points. Interval [2, 100]
4. Get the range of x.
5. Get the number of sample points.
6. Get the value of the function for a given x value.

The form of the quadratic function is: f(x) = ax2 + bx + c

**In mySystem\_CubicFunction, implement the followings.**

1. Ask the user to input the four coefficients: a, b, c and d.
2. Ask the user to input the range of x, i.e., minimum value and maximum value of x. The minimum and maximum values should be in the interval [-10, 10].
3. Ask the user to input the number of sample points. Interval [2, 100]
4. Get the range of x.
5. Get the number of sample points.
6. Get the value of the function for a given x value.

The form of the cubic function is: f(x) = ax3 + bx2 + cx + d

**In mySystem\_StudentManager, implement the followings.**

1. Ask the user to input the number of students. The number of students is in [2,100].
2. Ask the user to input the score of each student. The score range is [0, 100].
3. Show the range of the scores.
4. Show the average score.
5. Show the standard deviation of the scores.

Standard deviation = sqrt( sum(x – x’)\*(x-x’)/n ), where x’ is the average. Read the article about standard deviation in Wiki if you are not sure what it is.

1. Show the scores in an ascending order.
2. Get the number of students whose score is inside an interval [s0, s1] (inclusive).

Use ( rand( ))/(double) (RAND\_MAX-1)

to compute a random value between [0, 1].

**Submission**:

1. Change the folder name to ID\_Name, where ID is your student ID and Name is your name. Upload the entire folder of the source code to E3 platform before the deadline.
2. You must demo your work to our TAs in the lab time.
3. **If you cannot demo your programs, your score is zero.**

**Penalties:**

1. **Late submission: 10% penalty each day.**
2. **Cheating: you will be received a score of zero. E.g., borrowing your source code to others or/and copying others’ source code.**

**The folder 00\_StudentWork stores the files.**

The binary file is myFirstSystem.exe which is stored in ./bin/release/.