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## CSc 340 Homework

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Topics: Random numbers, structs, files, and system

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1. Develop a "guessing game" where the computer and the user alternatively guess the value of a randomly selected secret number between 1 and 99 (or any other maximum value). Initially, the computer selects the random number, and the user makes guesses. The computer evaluates each guess, and answers "too big", "too small", or "correct". The computer counts how many guesses are necessary to find the correct answer. Then, the roles are changed. The user selects a secret random number, and the computer makes guesses. The user evaluates the guesses and answers using > (for "too big"), < (for "too small"), and = (for "correct"). The player who detects the correct answer with the minimum number of guesses is the winner.

There is one more thing related to this problem. Computers are not smart, and therefore they do not cheat in games. As opposed to that, human players are smart and we must assume they can cheat when answering (>,<=) to computer-generated questions. In other words, you must design a program that will detect cheating. (Hint: Read file Programs posted on iLearn)

2. Write a program MakeFile.cpp that creates a file random.dat that contains 200 random numbers where each number is the sum of 12 random values  $\text{rand}() \% 9$ . When we add a sufficient number of uniformly distributed numbers the result is approximately normally distributed. Close your file. Then use system command to activate program Statistics.cpp that reads numbers from random.dat, and for these numbers computes and displays the mean value, standard deviation, and coefficient of variation. When control returns to MakeFile.cpp use system command to activate program Distribution.cpp that plots the histogram of the distribution of numbers from random.dat in the form similar to this:

```
0-5   |
5-10  |
10-15 | **
15-20 |
20-25 | ****
25-30 | *****
30-35 | *****
35-40 | *****
45-50 | *****
50-55 | *****
55-60 | *****
60-65 | *****
65-70 | *****
70-75 | *****
75-80 | ***
80-85 | ****
95-90 | *
90-95 |
95-100|
```

3. A text file students.txt contains student records (name, date of birth, and GPA). Write a program that reads student records from students.txt and creates an array of student structures S[ ] defined as follows:

```
struct Date
{   int month;
    int day;
    int year;
} ;

struct Student
{   string name;
    Date   dob;
    double GPA;
} S[200];
```

Process all records from the array S and compute the mean value, the standard deviation, and the coefficient of variation for student age, and for student GPA.