Lab 11 Arrays

Introduction to Computer Science I

# Objectives:

After performing this lab, the students should be able to

* write C++ programs that involve arrays

# Names of Lab Group Members:

## Activity

Provide your C++ source code and screenshots of your program outputs.

Write a program that allows the user to enter integer values and stores them in an array. The program asks the user for the number of integer values to be entered, which should be no more than 100, and then reads the values from standard input. The program then computes and displays the following information

* 1. the sum
  2. the average / mean
  3. the minimum and maximum
  4. the standard deviation (the square root of the average of the squared differences from the mean):



where N is the number of values, xi is the ith value, μ is the mean of all the values

Note: You must compute the above information using the array.

**OPTIONAL (do this if you finish early)**

1. The Fibonacci numbers are defined by the following sequence:

f1 = 1

f2 = 1

fn = fn-1 + fn-2

Write a program that computes the first 100 Fibonacci numbers and stores them in an array. The program then allows the user to enter an integer n (which is a strictly positive number, i.e. greater than 0) and displays the nth Fibonacci number, fn, that is stored in the array.

1. The birthday paradox is that there is a surprisingly high probability that two people in the same room happen to share the same birthday. By birthday, we mean the same day of the year (ignoring leap years), but not the exact birthday including the birth year or time of day. Write a program that approximates the probability that two people in the same room have the same birthday, for 2 to 50 people in the room.

The program should use simulation to approximate the answer. Over many trials (say, 5000), randomly assign birthdays to everyone in the room, count up the number of times at least two people have the same birthday, and then divide by the number of trials to get an estimated probability that two people share the same birthday for a given room size.

Your output should look something like the following. It will not be exactly the same due to the random numbers:

For 2 people, the probability of two birthdays is about 0.002

For 3 people, the probability of two birthdays is about 0.0082

For 4 people, the probability of two birthdays is about 0.0163

…

For 49 people, the probability of two birthdays is about 0.9654

For 50 people, the probability of two birthdays is about 0.969