**Lab 15**

**Lab Objectives:**

* To be familiar with the syntax of function definition/calling and its variations
  + Applying value types and reference types parameters (also called pass-by-value and pass-by-reference mechanisms)
  + Void function and formal/actual parameters
  + Value-returning functions and formal/actual parameters

**Lab Task 1**

Write down a function named ‘computeStats’, which returns both mean and standard deviation of 5 numbers x1, x2, x3, x4, and x5.

Note that the mean (average) of the numbers is x = (x1 + x2 + x3 + x4 + x5)/5 and the standard deviation is:

Graphical user interface, text, application

Description automatically generated

(**Hint:** Define computeStats as a void function and return mean and standard deviation by passing them as reference parameters and setting their values in the function.)

**Lab Task 2**

The following formula gives the distance between two points, (x1, y1) and (x2, y2) in the Cartesian plane:

Chart

Description automatically generated with medium confidence

Given the center (x1, y1) and a point on the circle (x2, y2), you can use this formula to find the radius of the circle. Write a program that prompts the user to enter the center and a point on the circle. The program should then output the circle’s radius, circumference and area. Your program must have at least the following functions:

**compute\_radius:** This function takes as its parameters four numbers that represent the center and a point on the circle, and returns the distance between them to find the radius of the circle, and returns the circle’s radius. This should be a value-returning function.

**circle\_stats:** This is a void function, which takes the radius of the circle as a (input) value parameter and returns the circle’s circumference and area as reference (output) parameter. (If r is the radius, the circumference is 2\*pi\*r, and the area is pi\*r2, where pi = 3.1416.)

**Lab Task 3.**

Write a function called grade\_gpa, that has an integer input parameter ‘points’, and 2 output parameters ‘grade’ and ‘gpa’. The points parameter represents student marks in [0-100] range. While, the ‘grade’ returns the appropriate letter

Grade according to ‘points’ using a straight scale (i.e. 90–100 is an A, 80–89 is a B, and so on until F). The second output parameter ‘gpa’ returns the student’s gpa in the subject using the rules (90-100 🡪 4.0, 80-89🡪3.5, 70-79🡪3.0, 60-69🡪2.5, 50-59🡪2.0, below 50🡪0). Call this funciton in main with different points values to test its working.