

Labsheet – Functions – Computer Programming

Exercise 1

Write a program that contains the following:

- A function `maxPosn()` that has as parameters an array `X` of integers and an integer `n`, representing number of values in `X` and returns the position of the maximum value in `X`.
- A `main()` function that declares an array `A` of size 10, allows the input of values for elements of `A` and uses the function `maxPosn()` to obtain the position of the highest value in `A`.
- The `main()` function should display the highest value in `A`.

Exercise 2

Write a function `sumArray()` that has as parameters two arrays `A` and `B` and calculates and stores the sum of corresponding elements of the arrays. Include any additional parameter(s) you consider necessary.

Write a `main()` function that uses the function `inputArray()` to perform the input of two integer arrays `X1` and `X2` and uses `sumArray()` to calculate the sum of corresponding values of `X1` and `X2`. It then displays the calculated values.

Exercise 3

Write a program that contains the following:

- A function `printMatrix()` has as parameters a matrix and number of rows and displays the elements in the form of a table. The number of columns in the matrix is 5.
- A function `inputMatrix()` that has as parameters a matrix `M` and an integer `n1`, and it performs the input of a matrix of size `n1x5`.
- A function `sumMatrix()` to find the sum of two matrices of 5 columns. The number of rows should be a parameter.
- A `main()` function that allows the input of an integer value `n`, calls the above functions to perform the input of two matrices `A` and `B` of size `nx5`, performs the sum of the matrices and displays the sum of the matrices.

Exercise 4

A toy is made of two balls, one fitted inside the other one as shown in the diagram below. The space in between the balls is filled with a liquid. Write a program that allows the input of the radius of each of the balls and calculates the volume of the liquid. The program should contain a function `sphereVolume` to calculate the volume of a sphere, given its radius. The program should make use of this function.

Exercise 5

Write a program that allows the input of values for x, y and z and uses the function square, to calculate the value of $40x^2 + 50y^2 + 20z^2$. The calculated value must then be displayed.

Exercise 6

Write a program containing the following functions:

- A function, cyl_Area() that has as parameter the radius of a cylinder and its height and returns the total outer surface area of the cylinder.
- A function cyl_Paint() that has as parameters the radius of a cylindrical tank (closed at both ends), the height of the tank and the price of painting per unit area and calculates and returns the price of painting the outside of the tank. The function should make use of the function cyl_Area().
- A main() function that allows the input of the radius and height of a cylindrical tank as well as the price of painting a unit area of the tank and displays the price of painting the tank.

Exercise 7

Write a function that takes as parameter the marks scored by a student in a module and returns the grade obtained, based on the following criteria:

Marks ≥ 70 : A
60 \leq Marks < 70 : B
50 \leq Marks < 60 : C
40 \leq Marks < 50 : D
Marks < 40 : F

Write the required main function code to allow a user to input the marks of a student and the program displays the grade of the student.

Note: use multiple return statements.

Exercise 8

Write a program that has the following functions:

- a function doubled_value() which takes as input 3 integers and returns the double of each.
- A main function that calls the function doubled_value() with values 1, 3, 7 and displays the results.

Exercise 9

Write a recursive function TwoPowerN to calculate 2^n . Implement the main program as well.

Exercise 10

Write a function 'computePower' that raises any value 'x' to an integer power 'n', by repeated multiplication, using: (1) Iteration and (2) Recursion. Implement the main program as well.