The American University in Cairo
School of Sciences and Engineering
Associate Dean for Undergraduate Studies
ENGR 3202- Engineering Analysis and Computation
Summer 2020

Project

Due Date: Saturday, Jul. 18th, 2020 at 11:59 pm

Title: A Computational Tool for Swimming Pool Design

Theme: Multi-dimension Numerical Integration

Problem Considered:

Introduction:

Recreational swimming pools are designed mainly for their beauty, and often display very irregular shapes such as kidney shapes. The designer of a pool needs to know the exact volume of the water in the pool in order to design its foundation, select the filters and chemical treatment equipment, as well as the circulation pump and overflow tank. Moreover, if the pool is heated, the heat load calculations require knowledge of the pool surface area, where most of the heat will be lost. The builder would also like to know the surface area of the pool sides in order to estimate the total amount of cladding material (e.g. ceramics). The shape of the pool may be specified as an equation (function) or numerical data (co-ordinates given at different points)

Problem Statement:

The project involves preparing computational software to assist the pool designer, by calculating the various volumes and areas he needs. The calculations are based on the use of multi-dimension numerical integration, and should be able to accept the shape of the pool in both function and numerical formats. The more accurate, the more user friendly and the more flexible and useful the program the better. The computer programs should be developed by the students themselves and make use of the Pseudo Codes presented in the textbook and instructor presentations. Students may use either MATLAB or C++ as their programming language for the project. The students should validate and verify their program using real-life swimming pool and computed volumes and areas from drafted swimming pool on a CAD software.

Deliverables:

The students should present their results in a proper technical report including the following sections: Abstract, Introduction, methodology, data and results, discussion and conclusion. The report should include a description of the work performed, important background material, description of the design method, a listing of all computer programs employed, a copy of the output, list of design scenarios investigated, and including a clear display of results with an appropriate analysis and discussion.

Computer programs and output print outs should be added to the appendix of the report. The softcopy of the program and the report are to be uploaded on blackboard. One submission per group.

Oral group discussion will asses the individual contribution of the group members to the delivered project. Based on the response of the member to the questions, he/she will be assigned a percentage of the group grade.

Group Size:

The project will be done in groups composed of maximum 3-4 students. Larger or smaller groups require pre-approval.

Important Dates:

4th of July 2020: Submission of project group names.

18th of July 2020: Submission of both the report and the softcopy of the program on blackboard no later than 11:59 pm.

19th of July 2020: Oral group discussion