Project 1 Part I

1.1 Overview

You should design basic data structures and classes for computer graphics.

- Part I: matrices and vectors
- Part II: mesh data structures

1.2 Required Functionality: Part I

Here are the elements that your program must have.

- **Vector Library:** you need to implement two header files – vec.h and mat.h. In these files, you will implement 4D vectors and 4x4 matrices. There will be some convenience functions to make it easier to embed "shorter" vectors in the 4D vector. The header files have specific documentation on what to implement.
- **Templates:** the vector and matrix classes are implemented using templates. The template argument is a numeric data type, e.g., float, double, etc. Familiarize yourself with templates and their advantages and limitations. Be prepared to answer some template-related questions to the TA.
- **Required Functionality Vectors:**
  - Element access and casting operators are provided, the rest should be implemented following the TODO tags in the header file.
- **Required Functionality Matrices**
  - Element access and casting operators are provided, the rest should be implemented following the TODO tags in the header file.
- Use const where appropriate for good code.
- **Test every method** you write in the main.cpp file. Submit your project including the test scenarios. Failure to submit adequate testing will result in loss of points for this assignment.

1.3 Using MS Visual Studio

We recommend using MS Visual Studio if you have access to a Windows machine. Create a new C++ project on your hard drive first. Locate the folder of the project. Copy the three files main.cpp, vec.h, mat.h to this folder. Then, in the Visual Studio IDE, right click on “header files” in the Solution Explorer panel. Select “Add”->”Add Existing”, browse to the location of the header files and add them. You can add multiple files in one step. Repeat this for main.cpp. You should now be able to compile the project, but it will not do anything before you implement the missing parts.

1.4 Part II

Part II will deal with the implementation of a mesh data structure and will be posted shortly.