

9 Computational Geometry Algorithms Library (CGAL)

9.1 Preamble

The exercises below are intended to provide a means to test your understanding of the programming-related material covered in the course. It is highly recommended that you work through these exercises as you cover the corresponding topics in the video lectures. By doing this, you will greatly strengthen your understanding of the material in these video lectures, which will greatly reduce the amount of pain and suffering required to complete the programming assignments in the course. In exercises that require the building (i.e., compiling and linking) of code, the CMake tool should be used for this purpose. For additional information about these exercises, refer to Section 1 of this document.

9.2 Topics Covered

These exercises cover CGAL.

9.3 Exercises

1. **HINT:** BEFORE ATTEMPTING THIS EXERCISE, READ THE DOCUMENT ON THE COURSE WEB SITE TITLED “USING LIBRARIES” WHICH IS AVAILABLE FROM THE FILE `using_libraries.txt`.

In this problem, we consider the following CGAL demo programs:

- The `meshMake` program, which consists of the single source file `meshMake.cpp`, and uses the CGAL library.
- The `meshInfo` program, which consists of the single source file `meshInfo.cpp`, and uses the CGAL library.
- The `meshSubdivide` program, which consists of the single source file `meshSubdivide.cpp`, and uses the CGAL library.
- The `wireframe` program, which consists of the single source file `wireframe.cpp`, and uses the SPL, CGAL, OpenGL, and GLUT libraries.

The source code for the `meshMake`, `meshInfo`, and `meshSubdivide` programs can be downloaded from the course web site in the file `cgal_examples.zip`. The source code for the `wireframe` program can be downloaded from the course web site in the file `wireframe.zip`.

- (a) Create a CMakeLists file (called `CMakeLists.txt`) that can be used to build all of the above programs.
- (b) Run each one of the programs to confirm that it works correctly. For example, type:

```
meshMake > mesh.off
meshlab mesh.off
meshInfo < mesh.off
meshSubdivide loop 5 < mesh.off > refinedMesh.off
meshlab refinedMesh.off
```

[Note: The `meshMake`, `meshInfo`, and `meshSubdivide` commands are assumed to be in a directory that is contained in your search path. If this is not the case, then you must specify a complete path name (i.e., including the directory) to the command file (e.g., if `meshMake` is in the current working directory, you could type `./meshMake` instead of `meshMake`).]

[Note: If the `meshlab` command is not installed on the system, try the `geomview` command instead.]