ME/HCI/CS/CprE 557 - Computer Graphics
Assignment 2
Programming and Geometric Modeling

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The goal of this homework is to exercise C/C++ programming using Visual Studio, XCode, or a similar integrated program environment as well as 3D modeling. When completing this assignment, you should be able to a) understand the basics datatypes, of command and control structure, and functions b) be able to render an object in 3D

This homework is a group homework: work on this homework in your group and discuss different solutions.

Problem 1

The following source code is part of a program. Unfortunately, the entire documentation is missing. Try to understand this code.

```
#include <iostream>
using namespace std;

int main(int argc, char *argv[])
{
        int p = myFunction(10);
        cout << p << endl;
}

double myFunction(int n)
{
        unsigned int i = 0, j = 1, t, k;
        for (k=0; k <= n; ++k)
        {
             t = i + j;
             i = j;
             j = t;
        }
        return j;
}
```

Goal

- Explain each single line of this code. Discuss the sequence in your team.
- This code causes an error when one try to compile / link it. What is wrong? Correct the mistake and add the information into your report
- What is the overall functionality? Can you rename the function and find a name that identifies the functionality.
- Which value is stored in p after the function jumps back into the main function.

Problem 2

For 3D computer graphics, all geometric models must be represented as primitives, especially when one works with OpenGL. Consider the object in Figure 3 as given. Your task is to represent this object as OpenGL 3D primitive and to render this object correctly; see the specific dimension of this object on the last page. Do not forget the color values.

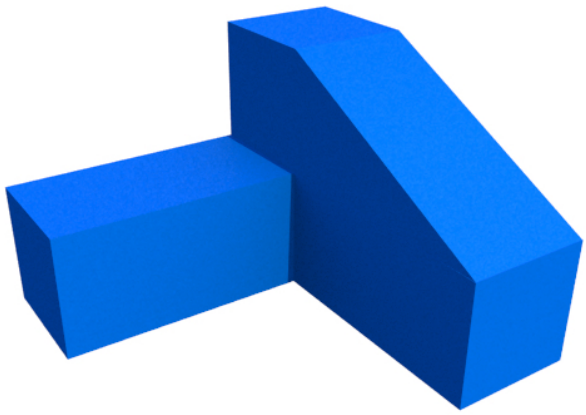


Figure 1: The 3D model that you need to create

You are supposed to create **two** model versions with two different OpenGL primitives.

- The first 3D model must be solely represented as triangle strip. Maximize the number of manifold surfaces. Prepare the function *unsigned int createTriangleStripModel(void)* , which uses the predefined vertex buffer array *vbaID[0]*.
- The second can be represented using primitives of your choice. You can combine different primitives. Prepare the function *unsigned int createMyModel(void)* , which uses the predefined vertex buffer array *vbaID[1]*.

A shader program has already been prepared. The variable name of the shader program is *program*. You can use the program to render both object. Make sure that all vertices are stored at index 0 of the vertex buffer array and the color values at index 1.
Discuss the difference online on Blackboard, contribute to the discussion (meaningful).

Deliverable

The following deliverables must be submitted via git:

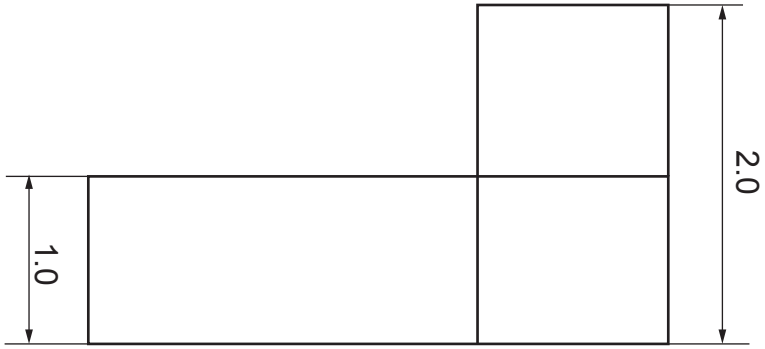
- A written report (1 page max) that answers the questions asked in Problem 1. Upload the document to your git repository to a folder *Homework_2\p1*
- Upload your solution (code) into a folder *Homework_2\p1* on git.
- Upload your solution for Problem 2 into a folder *Homework_2\p2* on git.

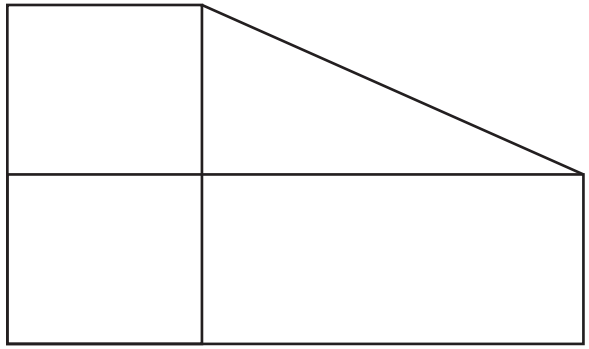
Due data: Thursday, Sept. 17th, 2015, 8:00 pm
Late submissions will not be accepted!

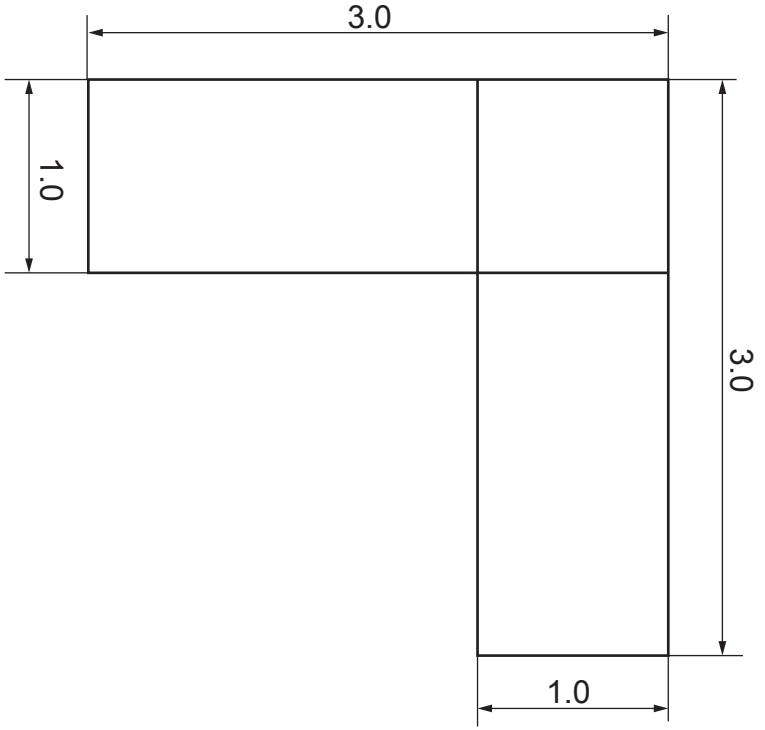
Grading

The following rubric will be used for grading. Max. 10 points can be earned.

- Problem 1: Find the mistake (1pt).
- Problem 1: Explain the functionality of the code and its purpose (1pt).
- Problem 1: Find the right value that is stored in p (1pt).
- Problem 2: Create the objects using only triangle strips (2pt).
- Problem 2: Create the objects using primitives of your choice strips (2pt).
- Problem 2: Render both objects correctly without any visual errors (missing primitives or color, vertices at the wrong location) (2pt).
- Problem 2: Discuss the differences between both versions on Blackboard, contribute to the discussion (1pt).







Do not take a ruler to measure any length,
use the specified values