<div align="center">**Do you want to build a Snowman?**</div>

<div align="center">Due: Friday, April 12, 2019 (11:59 AM, Noon)</div>

# 1   Overview

This assignment is designed for you to understand 3D rendering and transformation. In this homework, you are asked to build a snowman and to show some animation with our rendering engine.

First, define your own 3D primitive objects (other than a cube, like a sphere, a cylinder, a pyramid, etc) which are the building blocks for a snowman. Using your 3D primitives of at least 3 different kinds, you should 'build' a snowman. It is recommended to define the snowman hierarchically so that you can control some parts of the snowman intuitively.

Starting with our skeleton code, you should make your own 3D environment (background). You may port your HW1 implementation as a background. Then, bring your snowman into the scene, and make your snowman move by applying some 3D affine transformations (i.e. translation, rotation, and scaling) to some parts of the snowman. The animation effects should be controlled by a keyboard and/or mouse interaction. At least one of the animations should reflect that the snowman is a 3D model in a 3D environment.

By filling out *MouseButtonCallback(), CursorPosCallback(), KeyboardCallback()* in main.cpp, you can implement basic keyboard and mouse interaction. Also, you can use *glfwGetKey()* and *glfwGetMouseButton()* in GLFW to check the state of the keyboard and mouse (pressed or released). See: `https://www.glfw.org/docs/latest/input_guide.html` for more detail. Please try to show your creativity and imagination in composing the scene (e.g., interesting objects and animation effects).

Please also note that we provide you a sample 'HW1' solution so that you can refer its source code for implementing animation control (timing). It is also implemented in the skeleton code, but you will not get any credit if you use the sample solution as your background.

*Please keep the due date!* You also need to write a comment in your code and write up 2-3 page (10pt, 1.5 space) reports explaining what and how you have done to meet the specifications given below. **Do not just copy your code to your report. Please explain 'how' your implementation satisfies the specification**

## 2   Specification & Grading

| Specification | Grades |
|---|---|
| 1. Background | 10 |
| 2. Snowman | 25 |
| 2.1 At least 3 different kinds of objects(primitives) other than cubes (15) | |
| 2.2 Building a snowman (10) | |
| 3. Animation | 35 |
| 3.1 Implementing animations for the snowman (20) | |
| 3.2 Implementing keyboard and mouse interaction (15) | |
| 4. Documents | 10 |
| 5. Creativity | 20 |
| Total | 100 |

Table 1: Specification and Grading