Lab 01 - Open GL (Chapter 3)

I. Software Packages - Special Purpose (e.g. plotting programs) and General Purpose
   A. DirectX - Microsoft Proprietary. Largest use in industry. C++
   B. Open GL - Cross platform open source. Smaller use in industry. C
      i. Chosen because it is easy to use
      ii. Chosen because it is cross platform
      iii. Will use it in C++ - note: C++ is backwards compatible.

II. Graphics Functions Overview
   A. Graphics primitives - Basic building blocks, e.g., points, lines, triangles (even spheres, toroids)
   B. Attributes - Properties of primitives, e.g., color or line style
   C. Transformations - Scale, translate, rotation of objects
   D. Viewing - Camera + Projections
   E. Window Functions - Call before. Event-driven programming.
   F. Control Functions - Miscellaneous, e.g., clear screen.
   G. Note: resemblance to viewing pipeline + explain event driven programming.

III. Open GL Introduction
   A. GL library for only rendering. Will use GLU (general utility) for case of view+ projection and Open GL utility toolkit (GLUT) for windowing/guI/interaction
   B. Note: can use any windowing if you would in C, but must be in C/C++.
   C. Use C++ 11, 14, 17.

   1. Syntax
      i. All functions begin with gl (global namespace is C, e.g. glBegin())
      ii. All commands begin are GL_ then uppercase separated by - e.g. GL_LINES
      iii. Data type aliases are GLtype e.g. GLint or GLfloat note: just typedefs of i.v. function names commonly end with a number and or type initials
      iv. Why? No overloading in C, e.g. glVertex2f or glVertex3f

IV. Download projects.zip + compile for students

A. Walk through code to explain:
   i. glutInit
   ii. glutCreateWindow
   iii. glutDisplayFunc
   iv. glutIdleFunc

B. Looping frame rate (rudimentary way). Locked atrefresh rate of monitor e.g. 60fps/60fps
   i. Each frame record time
   ii. Take difference from last time (time to render)
   iii. 1/fps - render time = excess time, sleep for excess time

C. Clear Draw-Show animation - glutSwapBuffers

D. T, e, t, u, t with glut-Call backes: keypresses, date to chapter do for more.

E. Can do Exten learning in GL. Important as graphics code is difficult to test! See a. 5

V. Explain proj 01 assignment.