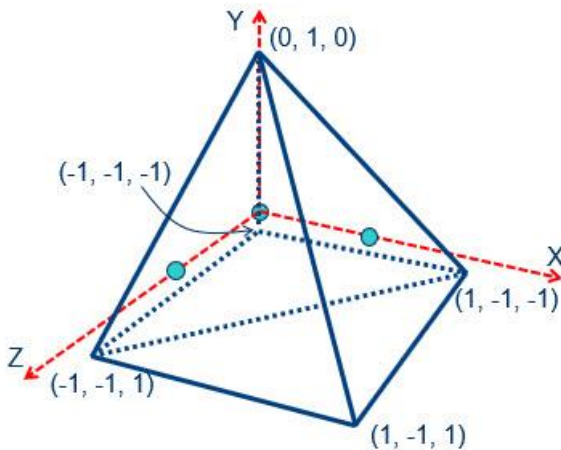# CS 535 Computer Graphics
Homework Assignment 4-1 (20 points)
Due: 10/04/2024

1. Modify the first example program for the notes "3D Data Structures, 3D Data Management and 3D Models" to replace the cube with the following pyramid. Be sure to properly specify the number of vertices in the *glDrawArrays()* command. (5 points)

Sol:

Simply replace the cube with the above pyramid in the first example program. Since the pyramid has 6 triangles, the number of vertices in the *glDrawArrays()* command should be 18 instead of 36. The output of the modified program is a red pyramid as follows.
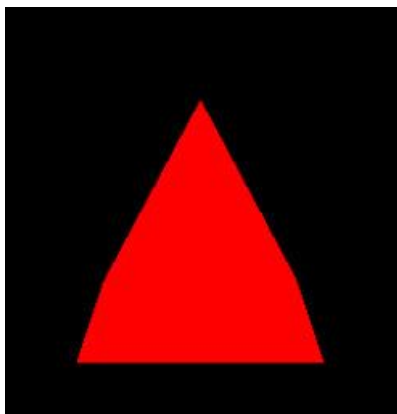
2. OpenGL lists the vertices of a triangle in a counter-clockwise direction with respect to the outward normal of the triangle for a 3D object. Why? (2 points)

Sol:

openGL uses this information to determine if a triangle is a **front triangle** or a **back trinagle**.

3. Propose a practical use for *glCullFace(GL_FRONT_AND_BACK).* (5 points)

    Sol:
    One can call *glCullFace(GL_FRONT_AND_BACK)* to make a specific object in a scene **invisible** for a specific purpose such as debugging.

4. What is the purpose of *'clearing the depth buffer'* each time through *display*() in a 3D case and what is the purpose of 'clearing the *color buffer'* each time through *display*() in a 3D case? (5 points)

    Sol:
    '*Clearing the depth buffer'* is to ensure hidden surfaces (performed by openGL using Z-Buffer method) are eliminated properly; '*clearing the color buffer*' is to ensure that we wouldn't get a trail of an moving object on screen.

5. In an OpenGL program, one can put computation of the projection matrix in *display()* or in *init().* Would there be any difference between these two choices? (3 points)

    Sol:
    If the view point is fixed, computing the projection matrix can be done either in *display()* or in *init().* If the view point is not fixed, say is floating, then computing the projection matrix should be done in *display()* (why?).

- Solutions must be typed (word processed) and emailed to me both as a pdf file and a word document before 23:59 on 09/30/2023.
- Please name your files as:
  CS535_HW4-1_2023f_LastName.docx / CS535_HW4-1_2023f_LastName.pdf