Homework
CMPE 240
World Coordinate System and Transformation Pipeline

This homework is for the creating and display of the world coordinate system and two 3D objects (one is a cube, and the other is a half sphere) based on the transformation pipeline. This homework is a part of the 3D graphics engine design on ARM Cortex CPU with C program emulation on either LPC11c24 or LPC1769 using a SPI LCD display device. Your program should:

1. (5 points) Draw x_w-y_w-z_w axis, and a floating cube. Make x_w as red, y_w as green and z_w as blue. Make the cube (wire frame) lines as white lines.
Note:
1.1. you may want to define each of the axis equal to 50.
1.2. E(x,y,z) = (200, 200, 200) and D = 20~50 for perspective projection.
1.3. Create a cube of size 100 for each of its sides, and place the cube float with one of its vertices equal to (100,100,110).
1.4. Draw the world coordinate system with the floating cube.

2. (5 points) Create a sphere with R = 100. You may want to create 8 to 10 levels of cross section contours, denoted as C_1, C_2, …, C_i, of the sphere as illustrated in the class. The largest contour C_1 is a circle on the x_w-y_w plane, then a set of parallel smaller contours with the same location of their center but with Z_w distance in the range of 5 to 10 of your choice from one to the other.
2.1. Write a program to compute equal distanced vertex on the contour and organize 4-vertices patches from every two consecutive contours, be sure to have all the vertices so the entire surface of the half sphere can be covered by the 4-vertices patches.
2.2. Draw the half sphere on top of of the world coordinate system and the cube.

3. Submission:
3.1. One photo of your LCD display with the result covering 1 to 2. You photo will have to show the entire prototype system and the LCD display, together with laptop computer which has Xpresso open and with a folder name that can be identified as your computer and your folder. For example, folder name: *home*/harry/homework-3D-graphics;
3.2. One photo of the laptop computer screen capture with Xpresso open and with your program (partial is ok) and folder in the background which can be used to identify your laptop.
3.3. Export your program as a project.
3.4. Zip all the above file into one with the following naming convention:
FirstName_LastName_SID_3D_cube_sphere.zip

(END)