SBEN224 Computer Graphics and Medical Visualization
Spring 2022

# Sheet 2

1. Suppose I have an object that is moved using the transformation M. The viewing transformation is given by the matrix P. And the camera is moved using the transformation matrix C. In what order should these transformations be applied to a vertex v? Express your answer as a matrix equation.

2. What is a shear transformation? Give a matrix for a general 2D y-shear, and explain why that matrix produces the desired result.

3. Here is the syntax for gluLookAt. gluLookAt(eyex, eyey, eyez, centerx, centery, centerz, upx, upy, upz) Suppose that the eye is located at the origin and the center point is (0,0,1) and up is (0,1,0) and we render a scene. Describe what would happen if up became (0,-1.9,0).

4. True or False: straight lines remain straight lines after a perspective projection.

5. Sketch the openGL pipeline and label the coordinate system involved.

6. Explain the depth buffering technique in OpenGL focusing on how it works and why it is used.

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8. What are the differences between flat shading, gouraud shading, and phong shading of polygons? Which one is directly supported by OpenGL?