Class Exercise – Week 9

Part 1 True or False

1. Rasterization casts rays into the scene through the picture plane.
2. For scaling transformation, we can only scale each axis by the same amount. I.e., the scaling factor for each axis should be the same.
3. The translation transformation can be represented by matrix multiplication without using homogeneous coordinates.
4. The intensity of specular shading is independent of view direction.
5. Flat shading shades each vertex.
6. In homogeneous coordinates, the **3D vector** (x, y, z) is represented by the 4D point (x, y, z ,0).

Part 2 Choices

1. **(Single choice)** In Graphics Pipeline, there are multiple stages, what is the correct order of these stages?

A. Vertex Processing → Rasterization → Triangle Processing → Fragment Processing → Framebuffer Operations
B. Vertex Processing → Triangle Processing → Rasterization → Fragment Processing → Framebuffer Operations
C. Vertex Processing → Triangle Processing → Fragment Processing → Rasterization → Framebuffer Operations
D. Vertex Processing → Triangle Processing → Rasterization → Framebuffer Operations → Fragment Processing

2. **(Multiple choice)** What invariants does the rotation transformation preserves? (you can choose multiple correct answers).

A. direction of vectors
B. distances between points
C. origin

Part 3 Questions and answers

1.Please describe the representation methods of geometry in computer graphics,

1）What is explicit geometric representation, and what is implicit geometric representation? Please describe in detail.

2）What are the advantages and disadvantages of explicit and implicit geometric representations? Please describe in detail.

2.Please list the different types of explicit geometric representation as many as possible, and please describe the characteristics of these types. Please describe in detail.

3. Please describe the Half-edge data structure. Please describe in detail.

4.Please describe the process of QEM mesh simplification. Please describe in detail.

5. Please describe the process of Catmull-Clark mesh subdivision. Please describe in detail.