Question Set 10

CS 320

Chapters 12 and 13

1. Give two reasons for performing clipping.

2. Why do we take the intermediate step of computing and clipping against clip coordinates, rather than immediately computing normalized device coordinates and clipping against them?

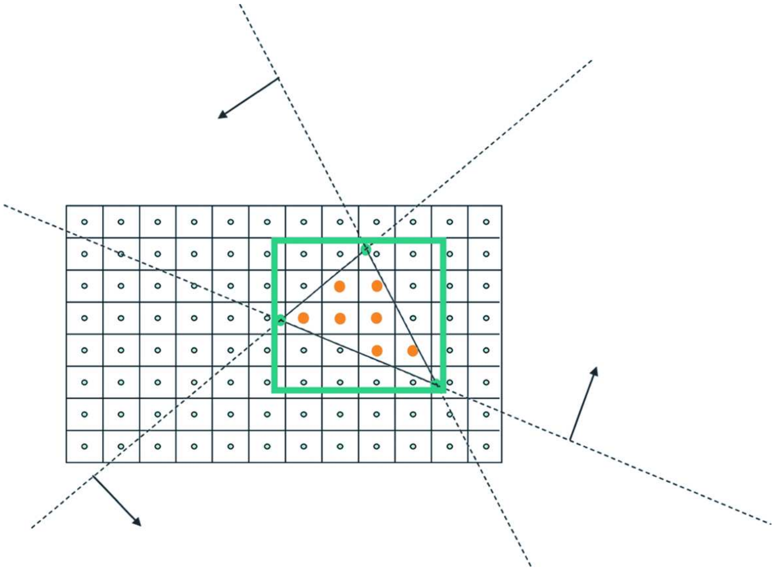
3. What are the comparisons used in performing clipping?

4. What is backface culling?

5. Conceptually and computationally, how do we determine if a triangle's front face is visible to the camera?

6. What is the purpose of the viewport matrix?

7. Starting from three vertices in window coordinates, explain how to rasterize a triangle.



8. How can one use this equation:

$$\begin{bmatrix} a & b & c \end{bmatrix} = \begin{bmatrix} v_1 & v_2 & v_3 \end{bmatrix} M^{-1}$$

derived from

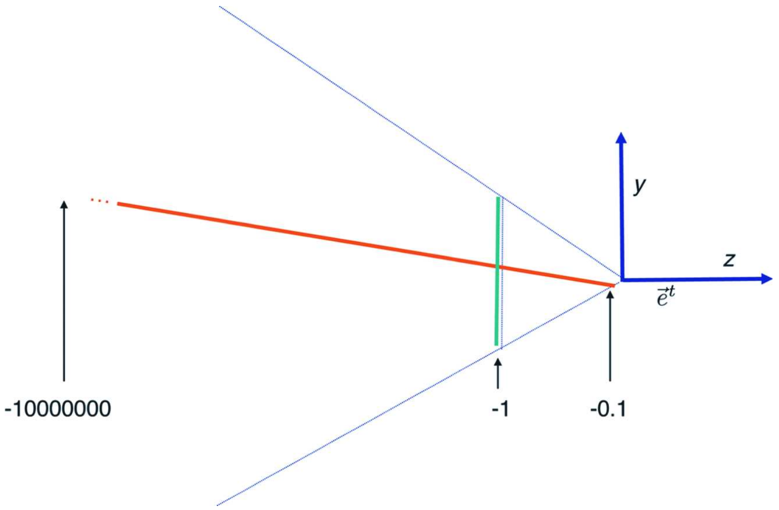
$$\begin{bmatrix} v_1 & v_2 & v_3 \end{bmatrix} = \begin{bmatrix} a & b & c \end{bmatrix} \begin{bmatrix} x_1 & x_2 & x_3 \\ y_1 & y_2 & y_2 \\ 1 & 1 & 1 \end{bmatrix}$$

to determine to determine the coefficients of an edge function

$$\text{edge} = ax_w + by_w + c$$

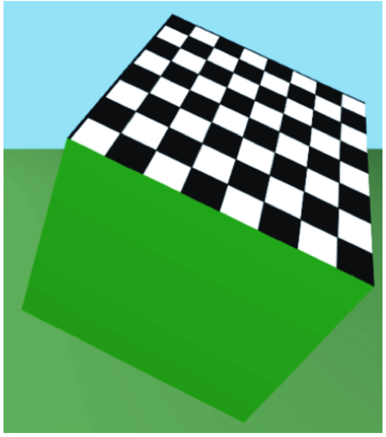
for use in rasterization?

9. Recall this figure

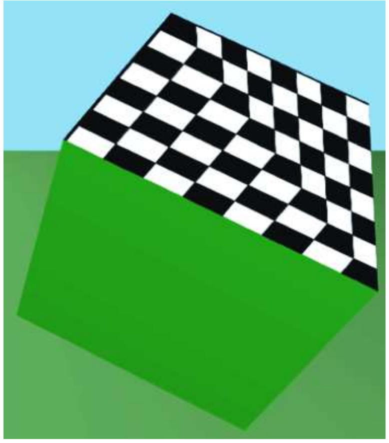


which demonstrated that using z_e for depth buffering gives incorrect results. Instead, z_w (which is z_n mapped onto $[0, 1]$) is used. Explain why z_w gives the correct result.

10. The textured face of this cube consists of two texture-mapped triangles, with appropriate texture coordinates assigned to each of the three vertices of each triangle.



In this figure, linear interpolation of the texture coordinates produces an incorrect image. Would this interpolation have been performed in object space, eye space, clip space, normalized device space, or window space? (Name all spaces in which this result could have occurred.) Explain why this happened.



How does rational linear interpolation correct this?