

Question Set 7

CS 420

Chapter 11

Be sure to explain your answers.

1. Compute z_c and w_c .

$$\begin{bmatrix} x_n w_n \\ y_n w_n \\ z_n w_n \\ w_n \end{bmatrix} = \begin{bmatrix} x_c \\ y_c \\ z_c \\ w_c \end{bmatrix} = \begin{bmatrix} s_x & 0 & -c_x & 0 \\ 0 & s_y & -c_y & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & -1 & 0 \end{bmatrix} \begin{bmatrix} x_e \\ y_e \\ z_e \\ 1 \end{bmatrix}$$

2. Consider the two points $[0, 0, -1, 1]^t$ and $[0, 0, -2, 1]^t$. Each point is in eye coordinates. Compute z_n for each point. Should the graphics pipeline use $<$ (less than) or $>$ (greater than) to determine which point is closer to the camera?
3. Are distances preserved by a projective transformation?
4. With depth buffering, does the order in which vertices are processed matter?
5. For a given piece of geometry, will every vertex processed have the same w_n value?
6. Starting with a frustum projection matrix P , suppose we replace P with PQ where

$$Q = \begin{bmatrix} 3 & 0 & 0 & 0 \\ 0 & 3 & 0 & 0 \\ 0 & 0 & 3 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

What will be the effect in the resulting image?