

**Name:** Charles Nathaniel Duke

1.

- a. The resulting image is a yellow rectangle. We are viewing one side of the cube at an angle that hides the rest. In the default image, this side is not visible.
- b. The resulting image is the same shape as the original cube, but rotated around x so that the pink side is placed out of view and the red side is brought into view, with the blue now being visible from where pink once was.
- c. Changing the projection matrix to these values causes the image to disappear. This is because we are actually too close, with far being at 1. We are actually inside of the cube.
- d. Changing the projection matrix to these values results in a prism-like shape using the default image. This is because these values represent us viewing the cube from much farther away.
- e. This causes the image to appear in the bottom left corner showing a portion of the blue and pink sides. With left being 0, we are looking far to the right on the object. With bottom being 0, we cannot see much of the bottom portion of the cube.

2.

- $$\text{mvMatrix} = \begin{bmatrix} -0.7071067811865476, & 0, & -0.7071067811865476, & 0 \\ -0.4082482904638631, & 0.8164965809277261, & 0.4082482904638631, & 0 \\ 0.5773502691896258, & 0.5773502691896258, & -0.5773502691896258, & -6.9282032302755105 \\ 0, & 0, & 0, & 1 \end{bmatrix}$$
- $$\text{pMatrix} = \begin{bmatrix} 0.5, & 0, & 0, & 0 \\ 0, & 0.25, & 0, & 0 \\ 0, & 0, & -0.1, & 0 \\ 0, & 0, & 0, & 1 \end{bmatrix}$$
- $$\begin{bmatrix} 0.5, & 0, & 0, & 0 \\ 0, & 0.25, & 0, & 0 \\ 0, & 0, & -0.1, & 0 \\ 0, & 0, & 0, & 1 \end{bmatrix} * \begin{bmatrix} 1 \\ 1 \\ -1 \\ 1 \end{bmatrix} = \begin{bmatrix} 0.5 \\ 0.25 \\ 0.1 \\ 1 \end{bmatrix}$$

3.  $\text{pMatrix} = \text{ortho}(-2, 2, -4, 4, 4, 10);$

4.

- $$\begin{bmatrix} 0.5, & 0, & 0, & 0 \\ 0, & 0.25, & 0, & 0 \\ 0, & 0, & -0.33, & 0 \\ 0, & 0, & 0, & 1 \end{bmatrix} * \begin{bmatrix} 1 \\ 1 \\ -1 \\ 1 \end{bmatrix} = \begin{bmatrix} 0.5 \\ 0.25 \\ 0.33 \\ 1 \end{bmatrix}$$
- $$\begin{bmatrix} 0.5, & 0, & 0, & 0 \\ 0, & 0.25, & 0, & 0 \\ 0, & 0, & -0.33, & 0 \\ 0, & 0, & 0, & 1 \end{bmatrix} * \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 0.5 \\ 0.25 \\ -0.33 \\ 1 \end{bmatrix}$$