R(Y) R(X)

Check 1.

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos\frac{\pi}{4} & -\sin\frac{\pi}{4} \\ 0 & \sin & \cos \end{bmatrix} \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} = \begin{matrix} 1 \\ \cos\frac{\pi}{4} - \sin\frac{\pi}{4} \\ \sin\frac{\pi}{4} + \cos\frac{\pi}{4} \end{matrix}$$

$$\begin{bmatrix} \cos\frac{\pi}{4} & 0 & \sin \\ 0 & 1 & 0 \\ -\sin & 0 & \cos \end{bmatrix} \begin{bmatrix} 1 \\ \emptyset \\ \sqrt{2} \end{bmatrix} = \begin{bmatrix} \cos\frac{\pi}{4} + \sqrt{2}\sin\frac{\pi}{4} \\ \emptyset \\ -\sin\frac{\pi}{4} + \sqrt{2}\cos\frac{\pi}{4} \end{bmatrix} = \begin{bmatrix} \frac{\sqrt{2}}{2} + 1 \\ \emptyset \\ -\frac{\sqrt{2}}{2} + 1 \end{bmatrix} = P_{xy}$$

Check 2

$$\begin{bmatrix} \cos\frac{\pi}{4} & 0 & \sin \\ 0 & 1 & 0 \\ -\sin & 0 & \cos \end{bmatrix} \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} = \begin{bmatrix} \cos\frac{\pi}{4} + \sin\frac{\pi}{4} \\ 1 \\ -\sin\frac{\pi}{4} + \cos\frac{\pi}{4} \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos & -\sin \\ 0 & \sin & \cos \end{bmatrix} \begin{bmatrix} \sqrt{2} \\ 1 \\ \emptyset \end{bmatrix} = \begin{bmatrix} \sqrt{2} \\ \cos\frac{\pi}{4} \\ \sin\frac{\pi}{4} \end{bmatrix} = P_{yx}$$

Check 3

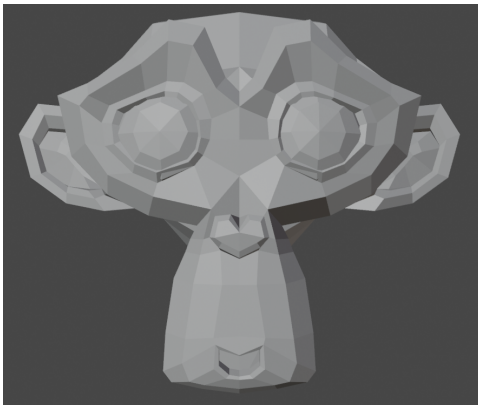
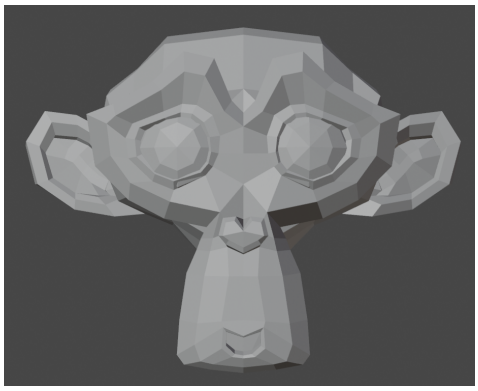
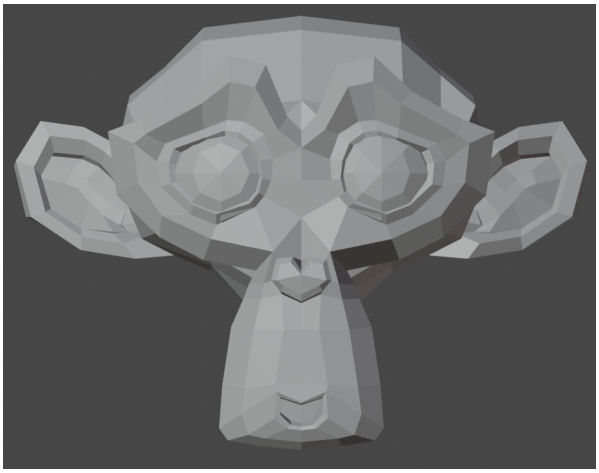
$$\begin{matrix} 2 & + & 1 \\ -1 & + & 1 \\ 2 & + & 1 \end{matrix} = \begin{pmatrix} 3 \\ 0 \\ 3 \end{pmatrix} = \text{T, World, Cube}$$

Check 4

$$\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & \sqrt{2}/2 & -\sqrt{2}/2 & 1 \\ 0 & \sqrt{2}/2 & \sqrt{2}/2 & 2 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 2 \\ -1 \\ 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 2+1=3 \\ \frac{-2\sqrt{2}}{2} = -\sqrt{2} \\ 0 \\ 1 \end{bmatrix}$$

$= T_{\text{world}}$ Cube

Checkpoint 5:

1. 
2. 
3. 

Checkpoint 6:

You can see that as the focal length increased, the focus of the camera moved from the monkeys' brows (closer to the camera) to the monkeys ears (further from the camera). The angle of view decreases and the magnification increases.

Checkpoint 7: