

Q3

$$\begin{matrix} x & y & z \\ P & (0 & 0 & -1) \\ Q & (-1 & 3 & 4) \\ R & (3 & -1 & 2) \end{matrix}$$

g) Translation

$$T = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ t_x & t_y & t_z & 1 \end{bmatrix}$$

$$d = \langle 1, 2, 3 \rangle$$

$$X \ Y \ Z \ 1 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ t_x & t_y & t_z & 1 \end{bmatrix} \begin{bmatrix} X \\ Y \\ Z \\ 1 \end{bmatrix}$$

$$= X + t_x \quad Y + t_y \quad Z + t_z$$

$$\begin{aligned} P' &= (3, 1, 2) \\ Q' &= (0, 5, 7) \\ R' &= (4, 1, 5) \end{aligned}$$

