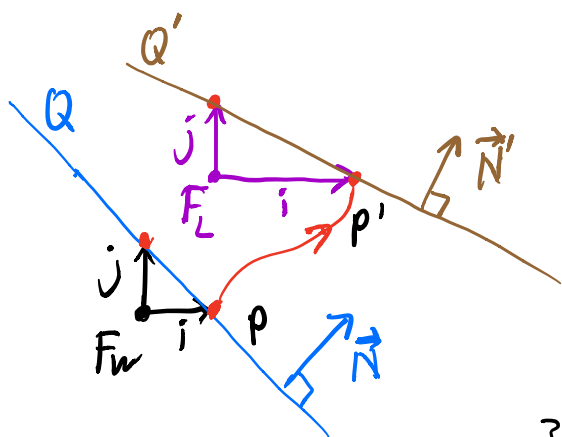


Transforming Normals — Example



$$M = \begin{bmatrix} 2 & 1 & \frac{1}{2} \\ & 1 & \\ & & 1 \end{bmatrix}$$

$$P' = M P$$

$$P = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

$$Q = \begin{bmatrix} A \\ B \\ C \\ D \end{bmatrix}$$

$$Q' = (M^{-1})^T Q$$

3D plane equation:

$$F(x, y, z) = 0 = Ax + By + Cz + D$$

Determining Q: $y = 1 - x$

$$0 = x + y - 1$$

$$\Rightarrow \begin{bmatrix} A \\ B \\ C \\ D \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 0 \\ -1 \end{bmatrix}$$

$$M^{-1} = \begin{bmatrix} \frac{1}{2} & & \\ & 1 & \\ & & 1 \end{bmatrix}$$

$$(M^{-1})^T = \begin{bmatrix} \frac{1}{2} & & \\ & 1 & \\ -\frac{1}{2} & -2 & 1 \end{bmatrix}$$

$$Q' = \begin{bmatrix} \frac{1}{2} & & \\ & 1 & \\ -\frac{1}{2} & -2 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \\ 0 \\ -1 \end{bmatrix} = \begin{bmatrix} \frac{1}{2} \\ 1 \\ 0 \\ -3.5 \end{bmatrix}$$

$$0 = Ax + By + Cz + D$$

$$0 = \frac{1}{2}x + y - 3.5$$

$$\Rightarrow y = -\frac{1}{2}x + 3.5$$