

$$R^T M R \hat{p} = \underbrace{\left[ \quad \right]}_{R^T} \underbrace{\left[ \quad \right]}_M \underbrace{\left[ \quad \right]}_R \underbrace{\begin{bmatrix} 3/\sqrt{14} \\ 2/\sqrt{14} \\ 1/\sqrt{14} \end{bmatrix}}_{\hat{p}}$$

The order of these don't matter, right?

$$R = R_x R_y R_z = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & \cos\theta & -\sin\theta & 0 \\ 0 & \sin\theta & \cos\theta & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \cos\theta & 0 & \sin\theta & 0 \\ 0 & 1 & 0 & 0 \\ -\sin\theta & 0 & \cos\theta & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \cos\theta & -\sin\theta & 0 & 0 \\ \sin\theta & \cos\theta & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$$R = \begin{bmatrix} \cos^2 t & -\cos t \sin t & \sin t & 0 \\ \cos t \sin^2 t + \cos t \sin t & \cos^2 t - \sin^3 t & -\cos t \sin t & 0 \\ \sin^2 t - \cos^2 t \sin t & \cos t \sin^2 t + \cos t \sin t & \cos^2 t & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

$M = ?$

$$I_s R^T M R \hat{p} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 3 & 2 & 1 & 0 \end{bmatrix} ?$$

$$\tan(\theta_y) = \frac{1}{2}$$

$$\arctan\left(\frac{1}{3}\right) = -0 \Rightarrow \theta_y = -0.3217505543966421934$$

$$\tan\left(\theta_z + \frac{\pi}{2}\right) = \frac{3}{2} \Rightarrow \arctan\left(\frac{3}{2}\right) - \frac{\pi}{2} = \theta_z = -0.58800260354756755125$$

$$\tan(\theta_x) = \frac{3}{2} \Rightarrow \theta_x = \arctan(3) \Rightarrow \theta_x = 1.24904577239825442583$$