

EXTRA PROBLEM

$$A'_i = \sum_{j=1}^3 R_{ij} A_j$$

$$\vec{A}' = R \vec{A} \quad \text{and} \quad (\vec{A}')^T = \vec{A}^T R^T$$

Length is preserved so $|\vec{A}'|^2 = |\vec{A}|^2$

$$|\vec{A}'|^2 = (\vec{A}')^T \vec{A}' = \vec{A}^T R^T R \vec{A}$$

$$|\vec{A}|^2 = \vec{A}^T \vec{A}$$

$$\vec{A}^T R^T R \vec{A} = \vec{A}^T \vec{A} \quad \text{for every } \vec{A}$$

Thus, $R^T R \equiv I$ (identity matrix)