

$$\mathbf{M}\vec{x} = \lambda \vec{x}$$

$$0 = \mathbf{M}\vec{x} - \mathbf{E}\lambda \vec{x}$$

$$= (\mathbf{M} - \lambda \mathbf{E}) \vec{x}$$

$$\vec{0} = \begin{pmatrix} 3-\lambda & 4 & 0 \\ 4 & 3-\lambda & 0 \\ 0 & 0 & 7-\lambda \end{pmatrix} \vec{x}$$

$$0 = \det(\mathbf{M} - \mathbf{E}\lambda)$$

$$= (3-\lambda)(3-\lambda)(7-\lambda) - 16(7-\lambda)$$

$$= (7-\lambda)(\lambda^2 - 6\lambda + 9)$$

$$\lambda_1 = 7$$

$$\lambda_2 = 7$$

$$\lambda_3 = -1$$