

MEEG 4703 Quiz #6

- 1. (20 points)** Determine a square root of the matrix \mathbf{A} as shown.

$$\mathbf{A} = \begin{bmatrix} 9.25 & -3.5 \\ 10.5 & -3 \end{bmatrix}$$

- 2. (10 points)** Using orthogonal matrix and diagonalization, **identify** and **graph** (to scale) the conic section

$$3x^2 - 8xy - 3y^2 = 5$$

Answers:

1. $\sqrt{\mathbf{A}} = \begin{bmatrix} 3.5 & -1 \\ 3 & 0 \end{bmatrix}$ $\left(\begin{array}{l} \lambda_1 = 4, \lambda_2 = 2.25 \\ \mathbf{M} = \begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix}, \mathbf{M}^{-1} = \begin{bmatrix} 2 & -1 \\ -3 & 2 \end{bmatrix} \end{array} \right)$

2. $\lambda_1 = 5, \lambda_2 = -5$

Hyperbola: $X^2 - Y^2 = 1$

$$\mathbf{P} = \frac{1}{\sqrt{5}} \begin{bmatrix} 2 & 1 \\ -1 & 2 \end{bmatrix}$$

$$\mathbf{R} = \mathbf{P}^T = \frac{1}{\sqrt{5}} \begin{bmatrix} 2 & -1 \\ 1 & 2 \end{bmatrix}$$

