

ASSIGNMENT

1. Verify the Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 9 & 2 \\ 2 & 6 \end{bmatrix}$.

2. Compute the eigenvalues and the corresponding eigenvectors of the matrix

$$A = \begin{bmatrix} 1 & 2 & 2 \\ 1 & 2 & -1 \\ -1 & 1 & 4 \end{bmatrix}$$

3. Find the values of λ for which the pair of equations $8x + 3y = \lambda x$ and $5x + 6y = \lambda y$ has non-trivial solutions.

4. Diagonalize the matrix

$$A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 1 & 2 \end{bmatrix}.$$

5. Find the symmetric matrix associated with the quadratic form

$$q(x) = 3x_1^2 + 2x_2^2 + x_3^2 + 4x_1x_2 + 4x_2x_3$$

and hence determine the definiteness of the quadratic form.