Eigenvalues and Transformations - Answers

Question 1: Eigenvalues

Matrix A: $\lambda_1 = \lambda_2 = 4$

Matrix C: $\lambda_1 = 1$, $\lambda_2 = -1$

Matrix D: $\lambda_1 = 4$, $\lambda_2 = -1$

Question 2: Eigenvectors

Matrix A: Any non-zero vector, e.g., $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$, $\begin{pmatrix} 0 \\ 1 \end{pmatrix}$

Matrix C: - For $\lambda = 1$: $\mathbf{v_1} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$ - For $\lambda = -1$: $\mathbf{v_2} = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$

Matrix D: - For $\lambda = 4$: $\mathbf{v_1} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$ - For $\lambda = -1$: $\mathbf{v_2} = \begin{pmatrix} 2 \\ -5 \end{pmatrix}$

Question 3: Transformation B

Transformation B: 90° counterclockwise rotation combined with scaling by $\frac{1}{2}$

Question 4: Transformation C

Transformation C: Reflection across the x-axis