

Instructions: You must show all work to receive full credit for the problems below. You may check your work with a calculator, but answers without work will receive minimal credit. Use exact answers unless the problem starts with decimals or you are specifically asked to round.

1. Find the eigenvalues and corresponding eigenvectors for each matrix below. Do the eigenvectors form a basis for the space?

a. $A = \begin{bmatrix} 1 & -7 \\ -1 & 5 \end{bmatrix}$

b. $A = \begin{bmatrix} 1 & -5 \\ 2 & -5 \end{bmatrix}$

2. Suppose A is a 4×4 matrix with eigenvalues 0, 1, 2, with the eigenvalue 1 repeated. What conditions would have to be satisfied to ensure that the matrix was diagonalizable and what would that D matrix look like?

3. Find a similarity transformation for the matrix $A = \begin{bmatrix} 2 & 2 \\ -13 & -8 \end{bmatrix}$. State the similarity transformation matrix P and the resulting matrix. If it diagonalizable, state P and D . If the eigenvalues are complex, state P and C , and find the scaling factor and rotation angle.