MA2071 Linear Algebra
C Term, Sections C01-C04
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PRACTICE ONLY – DO NOT HAND IN

20 minutes

Linear Algebra Quiz 7

For each of the following matrices, find a basis for $\mathbb{R}^n$ consisting entirely of eigenvectors for the matrix A. To do this, we need only find a basis for each eigenspace Nul $(A - \lambda I)$ since an important theorem tells us that eigenvectors associated to distinct eigenvalues are always linearly independent.

(a) $A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 5 \end{bmatrix}$ eigenvalues 2, 5.

(b) $A = \begin{bmatrix} 1 & 1 \\ -2 & 4 \end{bmatrix}$ eigenvalues 2, 3.

(c) $A = \begin{bmatrix} 10 & -9 & 6 \\ 4 & -2 & 4 \\ 2 & -3 & 6 \end{bmatrix}$ eigenvalues 4, 6.

(d) $A = \begin{bmatrix} 2 & 0 & -1 & 2 \\ 0 & 1 & -1 & 0 \\ 0 & 0 & 3 & 1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$ eigenvalues 2, 1 and 3.