

Problem

Consider:

$$A = \begin{pmatrix} 2 & 9 & 0 \\ 0 & 4 & 7 \\ 0 & 0 & 2 \end{pmatrix}$$

How many eigenvalues does this matrix have?

Solution

To find the eigenvalues, we solve the characteristic equation:

$$\det(A - \lambda I) = 0$$

Substituting the values:

$$\det \begin{bmatrix} 2 - \lambda & 9 & 0 \\ 0 & 4 - \lambda & 7 \\ 0 & 0 & 2 - \lambda \end{bmatrix} = 0$$

Expanding the determinant:

$$(2 - \lambda)(4 - \lambda)(2 - \lambda) = 0$$

This gives us $\lambda=2$ and $\lambda=4$. So, the matrix has **two** eigenvalues (i.e., 2 and 4).

Answer: 2