$(8\lambda + \quad)(\lambda - \quad)$

$Ax = \lambda I x$

$-8 + 4\lambda - 16\lambda + 8\lambda^2$

$8\lambda^2 - 12\lambda - 8$

3. Consider the following matrix A:

$$A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 1 & 0 \\ 4 & 2 & 2 \end{bmatrix}$$

$1(2-\lambda-0)[(2-4-4\lambda)2]$

$(2-\lambda)(\frac{-1}{2}+\lambda)-8$

$\begin{bmatrix} 1 & 2 \\ 1 & 4 \end{bmatrix} - \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$

$\begin{matrix} -1 & 2 \\ 1 & 2 \end{matrix}$

For each value of λ given below determine if it is an eigenvalue of A.

a) $\lambda = 0$ $\boxed{NO}$ b) $\lambda = -1$ $\boxed{NO}$ c) $\lambda = -2$ $\boxed{NO}$

$\left(\begin{array}{ccc|c} 0 & 1 & 2 & 0 \\ 1 & 1 & 0 & 0 \\ 4 & 2 & 2 & 0 \end{array}\right)$

$\downarrow$

$\begin{array}{ccc|c} 1 & 1 & 0 & 0 \\ 0 & 1 & 2 & 0 \\ 0 & -2 & 2 & 0 \end{array}$

$\downarrow$

$\begin{array}{ccc|c} 1 & 0 & -2 & 0 \\ 0 & 1 & 2 & 0 \\ 0 & 0 & 6 & 0 \end{array}$

$x_1 = 0, \; x_2 = 0, \; x_3 = 0$

NO because $A\begin{bmatrix}0\\0\\0\end{bmatrix} = 2\begin{bmatrix}0\\0\\0\end{bmatrix}$ eigenvector can't be $\emptyset$

$\left[\begin{array}{ccc|c} 1 & 1 & 2 & 0 \\ 1 & 2 & 0 & 0 \\ 4 & 2 & 3 & 0 \end{array}\right]$

$\downarrow$

$\left[\begin{array}{ccc|c} 1 & 1 & 2 & 0 \\ 0 & 1 & -2 & 0 \\ 0 & -2 & -5 & 0 \end{array}\right]$

$\downarrow$

$\begin{array}{cccc} 1 & 1 & 2 & 0 \\ 0 & 1 & -2 & 0 \\ 0 & 0 & 1 & 0 \end{array}$

$x_1 + x_2 + 2x_3 = 0 \quad x_1 = x_2 + 2x_3$

$x_2 - 2x_3 = 0 \quad x_2 = 2x_3$

$x_3 = 0$

$\begin{pmatrix}0\\0\\0\end{pmatrix}$

NO because $\begin{bmatrix}0\\0\\0\end{bmatrix}$ can't be $\emptyset$,

$\left[\begin{array}{ccc|c} -2 & 1 & 2 & 0 \\ 1 & -1 & 0 & 0 \\ 4 & 2 & 0 & 0 \end{array}\right]$

$\lambda^2 - 5\lambda + 4 + 2$

$\lambda^2 - 5\lambda + 6$

$(\lambda-3)(\lambda-2)$

$\lambda = 2, 3$

$\begin{array}{cccc} 0 & 1 & -2 & 0 \\ 1 & -1 & 0 & 0 \\ 0 & 1 & 0 & 0 \end{array}$ $= \lambda A$

$Ax = 2x$

$\begin{array}{cccc} 1 & 0 & -2 & 0 \\ 0 & 1 & -2 & 0 \\ 0 & 1 & 0 & 0 \end{array}$

$Ax = \lambda x$

yes free

$\begin{array}{cccc} 1 & 0 & -2 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & -2 & 0 \end{array}$

?

$\boxed{No}$

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