Question 1 / 3

1 point

Which of the following are the eigenvalues of $\begin{pmatrix} 1 & -1 \\ -1 & 2 \end{pmatrix}$?

- $\frac{3}{2} \pm \frac{\sqrt{3}}{2}$
- $\frac{3}{2} \pm \frac{\sqrt{5}}{2}$
- $\frac{1}{2} \pm \frac{\sqrt{3}}{2}$
- $\frac{1}{2} \pm \frac{\sqrt{5}}{2}$

This is an important equation because we use this to find the eigenvalues and it is called the **characteristic equation**:

$$\det(\mathbf{A} - \lambda\mathbf{I}) = 0 \tag{7.2}$$

The procedure for determining eigenvalues and eigenvectors is:

1. Solve the characteristic equation (7.2) for the scalar λ.
2. For the eigenvalue λ determine the corresponding eigenvector $\mathbf{u}$ by solving the system $(\mathbf{A} - \lambda\mathbf{I})\mathbf{u} = \mathbf{O}$.

$$\det\left(\begin{bmatrix} 1 & -1 \\ -1 & 2 \end{bmatrix} - \lambda\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}\right) = 0$$

$$\det\left(\begin{bmatrix} 1 & -1 \\ -1 & 2 \end{bmatrix} - \begin{bmatrix} \lambda & 0 \\ 0 & \lambda \end{bmatrix}\right) = 0$$

$$\det\left(\begin{bmatrix} 1-\lambda & -1 \\ -1 & 2-\lambda \end{bmatrix}\right) = 0$$

$$\det\begin{bmatrix} a & b \\ c & d \end{bmatrix} = ad - bc$$

$$(1-\lambda)(2-\lambda) - 1 = 0$$

$$(\lambda-1)(\lambda-2) = 1$$

$\lambda =$

or

$\lambda =$