(1 point)

Find the eigenvalues of A, given that $A = \begin{bmatrix} 3 & 0 & 0 \\ -6 & -3 & 0 \\ -8 & -4 & 1 \end{bmatrix}$

and its eigenvectors are $\begin{bmatrix} 0 \\ -1 \\ -1 \end{bmatrix}$, $\begin{bmatrix} 0 \\ 0 \\ -1 \end{bmatrix}$ and $\begin{bmatrix} 1 \\ -1 \\ -2 \end{bmatrix}$.

The eigenvalues are ______ , ______ , and ______ .

(1 point) Calculate $\det(A - \lambda I)$ for the following matrices A and values of λ

If $A = \begin{bmatrix} 7 & -5 \\ 10 & -8 \end{bmatrix}$, and $\lambda = 4$ then $\det(A - \lambda I) =$ ____

If $A = \begin{bmatrix} -14 & 10 \\ -20 & 16 \end{bmatrix}$, and $\lambda = 7$ then $\det(A - \lambda I) =$ ____

If $A = \begin{bmatrix} 26 & 9 \\ -54 & -19 \end{bmatrix}$, and $\lambda = 8$ then $\det(A - \lambda I) =$ ____

Determine if given λ is an eigenvalue of the given matrix A.

Select an Answer ∨ 1. $A = \begin{bmatrix} 7 & -5 \\ 10 & -8 \end{bmatrix}$, $\lambda = 4$

Select an Answer ∨ 2. $A = \begin{bmatrix} -14 & 10 \\ -20 & 16 \end{bmatrix}$, $\lambda = 7$

Select an Answer ∨ 3. $A = \begin{bmatrix} 26 & 9 \\ -54 & -19 \end{bmatrix}$, $\lambda = 8$

(1 point)

The matrix $A = \begin{bmatrix} 6 & 1 & 10 \\ 1 & -6 & 2 \\ -5 & -1 & -9 \end{bmatrix}$

has the $\lambda = -5$ as an eigenvalue with multiplicity 2 and the $\lambda = 1$ as an eigenvalue with multiplicity 1. Find the associated eigenvectors.

The eigenvalue -5 is associated with the eigenvector (, ,).

The eigenvalue 1 is associated with the eigenvector (, ,).

(1 point) Find the eigenvalues and corresponding eigenvectors of the matrix

$$A = \begin{bmatrix} -2 & -6 & -16 \\ 0 & 1 & -2 \\ 0 & 0 & 2 \end{bmatrix}$$

The eigenvalue $\lambda_1 =$ ____ corresponds to the eigenvector (____ , ____ , ____).

The eigenvalue $\lambda_2 =$ ____ corresponds to the eigenvector (____ , ____ , ____).

The eigenvalue $\lambda_3 =$ ____ corresponds to the eigenvector (____ , ____ , ____).

(1 point)

The matrix $C = \begin{bmatrix} 1 & -6 & -6 \\ 3 & 10 & 6 \\ -3 & -6 & -2 \end{bmatrix}$

has two distinct eigenvalues, $\lambda_1 < \lambda_2$:

$\lambda_1 =$ ______ has multiplicity ______ , and

$\lambda_2 =$ ______ has multiplicity ______ .

(1 point) The matrix

$$C = \begin{bmatrix} 12 & -8 & -32 \\ -4 & 8 & 16 \\ 4 & -4 & -12 \end{bmatrix}$$

has two distinct eigenvalues, $\lambda_1 < \lambda_2$:

$\lambda_1 =$ ______ has multiplicity ______. The dimension of the corresponding eigenspace is ______.

$\lambda_2 =$ ______ has multiplicity ______. The dimension of the corresponding eigenspace is ______.

Is the matrix C diagonalizable? (enter YES or NO) ______

(1 point) Let: $A = \begin{bmatrix} -34 & 39 \\ -26 & 31 \end{bmatrix}$

Find P, D and P^{-1} such that $A = PDP^{-1}$.

$P = \begin{bmatrix} \square & \square \\ \square & \square \end{bmatrix}$ $D = \begin{bmatrix} \square & 0 \\ 0 & \square \end{bmatrix}$ $P^{-1} = \begin{bmatrix} \square & \square \\ \square & \square \end{bmatrix}$

(1 point)

Let $M = \begin{bmatrix} 12 & -6 \\ 12 & -6 \end{bmatrix}$.

Find formulas for the entries of M^n, where n is a positive integer.

$M^n = \begin{bmatrix} \square & \square \\ \square & \square \end{bmatrix}$.

You might consider diagonalization of matrix $M =$ to ease the calculations.

(1 point) Let: $A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & -4 & 0 \\ -3 & -3 & -1 \end{bmatrix}$

Find invertible matrix P and diagonal matrix D such that $A = PDP^{-1}$.

$$P = \begin{bmatrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{bmatrix}, \quad D = \begin{bmatrix} 1\ \square & 0 & 0 \\ 0 & 1\ \square & 0 \\ 0 & 0 & 1\ \square \end{bmatrix}$$

Note: all answer blanks must be filled out