Problem 1. **(1 point)**

Consider the matrix $A = \begin{bmatrix} 4 & 2 & 0 \\ 2 & 4 & 0 \\ 0 & 0 & 6 \end{bmatrix}$. Find bases for each of the eigenspaces indicated below:

A basis for E_6 is ($\begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \end{bmatrix}$, $\begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \end{bmatrix}$

A basis for E_2 is ($\begin{bmatrix} \_\_ \\ \_\_ \\ \_\_ \end{bmatrix}$).

Answer(s) submitted:

- $\begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$
- $\begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$
- $\begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix}$

submitted: (correct)
recorded: (correct)

Problem 2. **(1 point)**

Suppose that all eigenvalues of a 9×9 matrix are real, and that among those are $\lambda = \lambda_1$ with algebraic multiplicity 1 and $\lambda = \lambda_2$ with algebraic multiplicity 2. Further suppose that the eigenvector associated with λ_1 is $\vec{v}_1$ and the eigenvectors associated with λ_2 are $\vec{w}_1, \vec{w}_2$, and that there are no other linearly independent eigenvectors associated with either λ_1 or λ_2. Finally, suppose all other eigenvalues of the matrix have algebraic multiplicity 1.

In this case, fill in the following values:
The geometric multiplicity of $\lambda_1 =$ __________
$\dim(\ker(A - \lambda_2 I)) =$ __________
Is A diagonalizable? [?/yes/no]

Answer(s) submitted:

- 1
- 2
- yes

submitted: (correct)
recorded: (correct)

Problem 3. **(1 point)**

If A and B are similar, which of the following are true?

- A. $\text{nullity}(A) = \text{nullity}(B)$
- B. A and B have the same eigenvectors.
- C. The algebraic and geometric multiplicities of the eigenvalues of A and B are the same.
- D. $\text{tr}(A) = \text{tr}(B)$
- E. $\text{rank}(A) = \text{nullity}(B^T)$
- F. $\text{rank}(A) = \text{nullity}(B)$

Answer(s) submitted:

- ACD

submitted: (correct)
recorded: (correct)