
Problem 1. Suppose A is a 6×5 matrix. If rank of $A = 4$, then nullity of $A =$

- F. 1

Problem 2. If \vec{x}_1 and \vec{x}_2 are solutions to $A\vec{x} = \vec{b}$, then $-5\vec{x}_1 + 8\vec{x}_2$ is also a solution to $A\vec{x} = \vec{b}$.

- B. False

Problem 3.

Let $A = \begin{bmatrix} 1 & -1 \\ 1 & 3 \end{bmatrix}$. Is $A =$ diagonalizable?

- B. no

Problem 4. Suppose A is a square matrix and $A\vec{x} = \vec{0}$ has an infinite number of solutions, then given a vector \vec{b} of the appropriate dimension, $A\vec{x} = \vec{b}$ has

- E. either no solution or an infinite number of solutions

Problem 5. Suppose $\begin{bmatrix} u_1 \\ u_2 \\ u_3 \end{bmatrix}$ is a unit vector in the direction of $\begin{bmatrix} 5 \\ 2 \\ 3.17214438511238 \end{bmatrix}$. Then $u_1 =$

- I. 0.8

Problem 6.

Which of the following is an eigenvalue of $\begin{bmatrix} 4 & 4 \\ 1 & 4 \end{bmatrix}$.

- G. 2

Problem 7. Suppose $A = PDP^{-1}$ where D is a diagonal matrix. Suppose also the d_{ii} are the diagonal entries of D . If $P = [\vec{p}_1 \vec{p}_2 \vec{p}_3]$ and $d_{11} = d_{33}$, then $\vec{p}_1 + \vec{p}_3$ is an eigenvector of A

- A. True

Problem 8. Suppose $A \begin{bmatrix} -2 \\ -2 \\ -1 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$. Then an eigenvalue of A is

- E. 0
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Problem 9. Suppose A is a 3×4 matrix. Then $\text{nul } A$ is a subspace of R^k where $k =$

- I. 4
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Problem 10.

Calculate the determinant of $\begin{bmatrix} -1.125 & -1 \\ 8 & 8 \end{bmatrix}$.

- D. -1
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Problem 11.

Let $A = \begin{bmatrix} 8 & -24 & 32 \\ 0 & 2 & 8 \\ 0 & 0 & 8 \end{bmatrix}$. Is A diagonalizable?

- A. yes
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Problem 12.

Suppose the orthogonal projection of $\begin{bmatrix} -4 \\ 7 \\ 2 \end{bmatrix}$ onto $\begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix}$ is (z_1, z_2, z_3) . Then $z_1 =$

- B. -3
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Problem 13. The vector \vec{b} is in $\text{Col}A$ if and only if $A\vec{v} = \vec{b}$ has a solution

- A. True

Problem 14.

$$\text{Let } A = \begin{bmatrix} 5.31034482758621 & 2.12413793103448 & -5.7448275862069 \\ 4.22413793103448 & 1.68965517241379 & -5.7448275862069 \\ 0 & 0 & -2.46206896551724 \end{bmatrix}$$

$$\text{and let } P = \begin{bmatrix} -2 & -4 & 7 \\ 5 & -7 & 7 \\ 0 & -8 & 3 \end{bmatrix}.$$

Suppose $A = PDP^{-1}$. Then if d_{ii} are the diagonal entries of D , $d_{11} =$

- E. 0

Problem 15.

Let $A = \begin{bmatrix} 15 & -6 \\ 5 & -2 \end{bmatrix}$.

Which of the following could be a basis for $\text{null}(A)$?

- B. $\left\{ \begin{bmatrix} 2 \\ 5 \end{bmatrix} \right\}$