Problem 1. Suppose *A* is a 5×7 matrix. If rank of A = 4, then nullity of A =

• H. 3

Problem 2. Suppose $A = PDP^{-1}$ where *D* is a diagonal matrix. Suppose also the d_{ii} are the diagonal entries of D. If $P = \begin{bmatrix} \vec{p_1} & \vec{p_2} & \vec{p_3} \end{bmatrix}$ and $d_{11} = d_{33}$, then $\vec{p_1} + \vec{p_3}$ is an eigenvector of *A*

• A. True

Problem 3.

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

Problem 4.

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

• A. yes

Problem 5. The vector \vec{b} is in *ColA* if and only if $A\vec{v} = \vec{b}$ has a solution

• A. True

Problem 6.

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

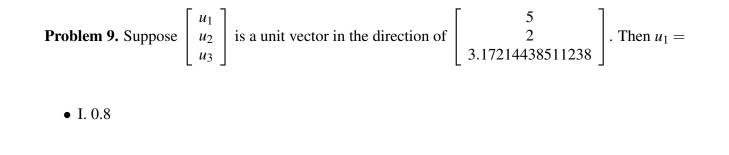
• B. no

Problem 7. Calculate the determinant of $\begin{bmatrix} -1.125 & -1 \\ 8 & 8 \end{bmatrix}$.

• D. -1

Problem 8. Suppose A is a 3×4 matrix. Then *nul* A is a subspace of R^k where k =

• I. 4



Problem 10. 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 11.	г.		1
Which of the following is an eigenvalue of	4	4	
	1	4	•

• G. 2

Problem 12.

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

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

• E. 0

Problem 14. 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 15.

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

Which of the following could be a basis for null(A)?

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