

Name: _____

Quiz 5

Use of the textbook or notes is not allowed. No electronic devices or calculators are allowed. To get credit, you must show **ALL** of your work, unless otherwise stated in the problem. Please do not cheat. *"The first and worst of all frauds is to cheat one's self."*

Read each question carefully and follow the directions stated in each question.

1. Consider the matrix $A = \begin{bmatrix} 1 & -10 & -24 & -42 \\ 1 & -8 & -18 & -32 \\ -2 & 20 & 51 & 87 \end{bmatrix}$. Row reduction to RREF yields the matrix $\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \end{bmatrix}$.

(a) (2 points) Find a basis for $\text{col } A$. $\left\{ \begin{bmatrix} 1 \\ 1 \\ -2 \end{bmatrix}, \begin{bmatrix} -10 \\ -8 \\ 20 \end{bmatrix}, \begin{bmatrix} -24 \\ -18 \\ 51 \end{bmatrix} \right\}$

(b) (1 point) What is $\text{rank } A$? **3**

(c) (2 points) Find a basis for $\text{Nul } A$. $\left\{ \begin{bmatrix} -2 \\ -2 \\ -1 \\ 1 \end{bmatrix} \right\}$

(d) (1 point) What is $\text{nullity } A$? **1**

2. (4 points) Find the eigenvalues and corresponding eigenvectors of $A = \begin{bmatrix} 2 & 1 \\ 0 & -1 \end{bmatrix}$.

$$\lambda_1 = 2, v_1 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}. \lambda_2 = -1, v_2 = \begin{bmatrix} -1 \\ 3 \end{bmatrix}.$$

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Read each question carefully and follow the directions stated in each question.

1. Consider the matrix $A = \begin{bmatrix} 1 & -10 & -24 & -42 \\ 1 & -8 & -18 & -32 \\ -2 & 20 & 48 & 84 \end{bmatrix}$. Row reduction to RREF yields the matrix $\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 0 & 0 \end{bmatrix}$.

(a) (2 points) Find a basis for $\text{col } A$. $\left\{ \begin{bmatrix} 1 \\ 1 \\ -2 \end{bmatrix}, \begin{bmatrix} -10 \\ -8 \\ 20 \end{bmatrix} \right\}$

(b) (1 point) What is $\text{rank } A$? 2

(c) (2 points) Find a basis for $\text{Nul } A$. $\left\{ \begin{bmatrix} -2 \\ -2 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 1 \\ 0 \end{bmatrix} \right\}$

(d) (1 point) What is $\text{nullity } A$? 2

2. (4 points) Find the eigenvalues and corresponding eigenvectors of $A = \begin{bmatrix} 3 & 0 \\ 1 & -1 \end{bmatrix}$.

$$\lambda_1 = 3, v_1 = \begin{bmatrix} 4 \\ 1 \end{bmatrix}. \lambda_2 = -1, v_2 = \begin{bmatrix} 0 \\ 1 \end{bmatrix}.$$

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Read each question carefully and follow the directions stated in each question.

1. Consider the matrix $A = \begin{bmatrix} 1 & -10 & -24 & -42 \\ 1/2 & -5 & -12 & -21 \\ -2 & 20 & 48 & 84 \end{bmatrix}$. Row reduction to RREF yields the matrix $\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$.

(a) (2 points) Find a basis for col A . $\left\{ \begin{bmatrix} 1 \\ 1/2 \\ -2 \end{bmatrix} \right\}$

(b) (1 point) What is rank A ? 1

(c) (2 points) Find a basis for Nul A . $\left\{ \begin{bmatrix} -2 \\ 0 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 1 \\ 0 \end{bmatrix} \right\}$

(d) (1 point) What is nullity A ? 3

2. (4 points) Find the eigenvalues and corresponding eigenvectors of $A = \begin{bmatrix} 4 & 0 \\ 0 & -1 \end{bmatrix}$.

$$\lambda_1 = 4, v_1 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}. \lambda_2 = -1, v_2 = \begin{bmatrix} 0 \\ 1 \end{bmatrix}.$$