

Quiz 4

Name: _____ Solutions _____

Score: _____

1.

Linear functions	$m \times n$ Matrix	n vectors in $\mathbb{R}^m$
$f : \mathbb{R}^n \rightarrow \mathbb{R}^m$	$[f(e_1) \cdots f(e_n)]$	$\{f(e_1), \dots, f(e_n)\}$
one to one	No free var's in RREF	linearly indep
onto	No zero rows in RREF	$\text{Span}(v_1, \dots, v_n) = \mathbb{R}^m$
isomorphism	RREF is identity!	Basis for $\mathbb{R}^m$

2. Find the determinant $\det A$ of the matrix A . Is A invertible?

$$A = \begin{bmatrix} 4 & 12 & 0 \\ -1 & -5 & -2 \\ 1 & 9 & 6 \end{bmatrix}$$

$$\det A = 0$$

Not invertible.

Determinant $\det A =$ _____

Invertible

Not Invertible

3. Find a basis for the column space and null space of the matrix A :

$$A = \begin{bmatrix} 4 & 12 & -8 & 4 \\ 1 & 3 & -3 & 1 \\ 3 & 9 & -5 & 4 \end{bmatrix}$$

Reduced Row Echelon Form:

$$\begin{bmatrix} 1 & 3 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Null space Basis:

$$\text{Nul}A : \left\{ \begin{bmatrix} -3 \\ 1 \\ 0 \\ 0 \end{bmatrix} \right\} \quad \text{dimension: 1}$$

Column space Basis:

$$\text{Col}A : \left\{ \begin{bmatrix} 4 \\ 1 \\ 3 \end{bmatrix}, \begin{bmatrix} -8 \\ -3 \\ -5 \end{bmatrix}, \begin{bmatrix} 4 \\ 1 \\ 4 \end{bmatrix} \right\} \quad \text{dimension: 3}$$

Basis for $\text{Nul}A$: _____

Basis for $\text{Col}A$: _____