

Name: _____ Date: _____

Show your work very clearly, neatly, and box your final answer.**One Side Only**

1. Find all eigenvalues and corresponding eigenvectors for $A = \begin{bmatrix} 3 & -1 \\ 1 & 1 \end{bmatrix}$.

2. Prove that if a column of square matrix A of order n consists entirely of zeros then $\det(A) = 0$.

3. Find all eigenvalues and corresponding eigenvectors for $A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & -1 & 0 \\ 2 & 1 & -1 \end{bmatrix}$.

4. Find all eigenvalues and corresponding eigenvectors for $A = \begin{bmatrix} 6 & -4 \\ 3 & -1 \end{bmatrix}$,

5. Find all eigenvalues and corresponding eigenvectors for $A = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 3 & 1 \\ 0 & 5 & -1 \end{bmatrix}$.

4. Show that $\begin{vmatrix} a & 1 & 1 & 1 \\ 1 & a & 1 & 1 \\ 1 & 1 & a & 1 \\ 1 & 1 & 1 & a \end{vmatrix} = (a-1)^3(a+3)$

4. True or False:

a. $\det(\mathbf{AB}) = \det(\mathbf{B})\det(\mathbf{A})$

Ans: _____

b. $\det(\mathbf{A} + \mathbf{B}) = \det(\mathbf{A}) + \det(\mathbf{B})$

Ans: _____

c. $\det(\mathbf{A}^n) = (\det(\mathbf{A}))^n$

Ans: _____

d. If $\det(A) = \det(B)$, then $A = B$.

Ans: _____

e. If $\det(\mathbf{A})\det(\mathbf{B}) = 1$, then A & B are inverse of each other.

Ans: _____

5. Find \mathbf{A}^{-1} , $|\mathbf{A}|$ and \mathbf{A}^T for the following matrix, then determine if the matrix is orthogonal. Feel Free to use **Maple** for this, and attach your print out.

$$\mathbf{A} = \begin{bmatrix} -\frac{1}{2} & -\frac{1}{2} & -\frac{1}{2} & -\frac{1}{2} \\ \frac{1}{2} & \frac{5}{6} & \frac{1}{6} & \frac{1}{6} \\ -\frac{1}{2} & -\frac{1}{6} & \frac{5}{6} & -\frac{1}{6} \\ \frac{1}{2} & \frac{1}{6} & \frac{1}{6} & \frac{5}{6} \\ -\frac{1}{2} & -\frac{1}{6} & -\frac{1}{6} & \frac{5}{6} \end{bmatrix}$$