

Review for TEST 2

Linear Algebra MTH 3331

1. Find the determinant of the matrix:

$$\begin{bmatrix} 1 & 0 & 0 \\ 2 & 3 & 0 \\ 6 & 7 & 5 \end{bmatrix}.$$

2. Use expansion by cofactors to find the determinant of the matrix

$$\begin{bmatrix} -1 & 4 & 2 & 1 & -3 \\ 0 & 3 & -4 & 5 & 2 \\ 0 & 0 & 2 & 7 & 0 \\ 0 & 0 & 2 & 4 & 0 \\ 1 & 0 & 1 & 0 & 1 \end{bmatrix}$$

See Example 4 page 124.

3. Evaluate the determinants

$$\begin{vmatrix} 1 & -2 & 0 \\ 7 & 1 & 5 \\ 0 & 4 & 2 \end{vmatrix}$$

4. Use elementary row or column operation to evaluate the determinant

$$\begin{vmatrix} 0 & -3 & 8 & 2 \\ 8 & 1 & -1 & 6 \\ -4 & 6 & 0 & 9 \\ -7 & 0 & 0 & 14 \end{vmatrix}$$

See Example 2 page 131.

5. If $A = \begin{bmatrix} 1 & 2 \\ 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 2 \\ 3 & 0 \end{bmatrix}$, find $|A|$, $|B|$, AB and $|AB|$.

See Example 1 page 139.

- 6a. Use the fact that $|cA| = c^n|A|$ to evaluate the determinant

$$\begin{vmatrix} 4 & 16 & 0 \\ 12 & -8 & 8 \\ 16 & 20 & -4 \end{vmatrix}$$

- 6b. Find $|AA^T|$ if $A = \begin{bmatrix} 1 & 5 & 4 \\ 0 & -6 & 2 \\ 0 & 0 & -3 \end{bmatrix}$.

See Example 6 on page 145.

7. Use the determinant of the coefficient matrix to determine whether the following system of linear equations has a unique solution.

$$\begin{aligned}x - y + z &= 4 \\2x - y + z &= 6 \\3x - 2y + 2z &= 0\end{aligned}$$

See Example 5 page 144.

8. Find the characteristic equation of the matrix $\begin{bmatrix} 1 & -2 & 1 \\ 0 & 1 & 4 \\ 0 & 0 & 2 \end{bmatrix}$.

See Problem 11 page 153.

9. Find the eigenvalues of the matrix $\begin{bmatrix} 2 & -3 \\ 1 & -2 \end{bmatrix}$.

See Example 2 page 139.

10. Use Cramer's Rule to solve the system:

$$4x_1 - 2x_2 + 3x_3 = -2$$

$$2x_1 + 2x_2 + 5x_3 = 16$$

$$8x_1 - 5x_2 - 2x_3 = 4$$

See Example 4 page 159.