

## MATH 1300 ASSIGNMENT PROBLEMS (UNIT 5)

- [10] 1. Use a third row cofactor expansion to evaluate the determinant of

$$A = \begin{bmatrix} 4 & 1 & 2 & 3 \\ 3 & 1 & 2 & 5 \\ 2 & 3 & 4 & 1 \\ 1 & 2 & 3 & 4 \end{bmatrix}.$$

- [10] 2. Compute the determinant of  $A = \begin{bmatrix} 4 & 5 & 1 & 3 \\ 2 & 4 & 6 & 4 \\ 4 & 1 & 5 & 1 \\ 5 & 6 & 3 & 1 \end{bmatrix}$  by the method of using elementary row operations to transform the matrix  $A$  into an upper triangular matrix.

[10] 3. Let  $A = \begin{bmatrix} 1 & 3 & 4 \\ 2 & 4 & 1 \\ 1 & 2 & 3 \end{bmatrix}$ .

- Find the matrix  $\text{adj}(A)$ .
- Compute the matrix product  $A \cdot \text{adj}(A)$ .
- Use the information from part (b) to determine the value of  $\det(A)$ . Explain.
- Use the information from parts (a) and (c) to find the inverse matrix  $A^{-1}$ .

- [10] 4. Use Cramer's rule to solve the following system of linear equations.

$$\begin{aligned}x + 2y + 3z &= 9 \\2x - y + 2z &= 11 \\4x - 2y - z &= 7\end{aligned}$$

[10] 5. Let  $A$  and  $B$  be  $3 \times 3$  matrices with  $\det(A) = 2$  and  $\det(B) = 5$ . Determine the values of the following.

(a)  $\det(AB)$

(b)  $\det(AB^{-1})$

(c)  $\det(A^T B)$

(d)  $\det(3B)$

(e)  $\det(\text{adj}(AB))$

[10] 6(a) Let  $A = \begin{bmatrix} k & -3 \\ 1 & k-4 \end{bmatrix}$ . For what values of  $k$  is the matrix  $A$  noninvertible?

(b) Let  $B = \begin{bmatrix} 1 & 1 & 1 \\ 2 & k & 1 \\ 3 & 1 & k \end{bmatrix}$ . For what values of  $k$  is the matrix  $B$  noninvertible?