

## MATH 1300 ASSIGNMENT PROBLEMS (UNIT 5)

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

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

- [10] 2. Compute the determinant of  $A = \begin{bmatrix} 4 & 1 & 5 & 2 \\ 2 & 4 & 6 & 8 \\ 4 & 5 & 1 & 3 \\ 5 & 6 & 3 & 1 \end{bmatrix}$  by the method of using elementary row operations to transform the matrix A into an upper triangular matrix.

[10] 3. Let  $A = \begin{bmatrix} 1 & 3 & 0 \\ 4 & 2 & 1 \\ 1 & 3 & 2 \end{bmatrix}$ .

- 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.

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

[10] 5. Let  $A$  and  $B$  be  $3 \times 3$  matrices with  $\det(A) = 2$  and  $\det(B) = 6$ . Determine the values of the following.

(a)  $\det(AB)$

(b)  $\det(A^{-1}B)$

(c)  $\det(A^T B^{-1})$

(d)  $\det(5A)$

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

[10] 6(a) Let  $A = \begin{bmatrix} k & 12 \\ -1 & k-7 \end{bmatrix}$ . For what values of  $k$  is the matrix  $A$  noninvertible?

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