

# Homework

## MATH 131

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1. Let  $\det(A) = 3$  and  $\det(B) = -7$ .

(a) Find  $\det(A^{-1})$ .

(b) Find  $\det(B^2)$ .

(c) Find  $\det(AB)^{-1}$ .

2. Let  $A = \begin{pmatrix} 1 & 2 & 4 \\ 0 & 3 & -1 \\ 2 & -3 & 5 \end{pmatrix}$ . Find the cofactor  $A_{23}$ .

3. Find the determinant of the matrix  $\begin{pmatrix} 1 & 0 & 7 \\ 2 & 3 & -1 \\ 5 & 8 & 0 \end{pmatrix}$

4. Find the determinant of the matrix  $\begin{pmatrix} 2 & 1 & 3 & 1 \\ 2 & 3 & -1 & 5 \\ 6 & 8 & 2 & 0 \\ 0 & 2 & 2 & 1 \end{pmatrix}$

5. If  $A^{-1} = A^T$ , show that  $\det(A) = \pm 1$ .

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6. Using Cramer's rule solve

$$2x - 3y = 4$$

$$3x + 5y = 9.$$

7. Using Cramer's rule solve

$$x - 3y + z = 11$$

$$2x + y - 8z = 2$$

$$4x - 2y - 3z = 1$$

8. Find the adjoint of  $\begin{pmatrix} 1 & 2 & -3 \\ 2 & 5 & -1 \\ 3 & 3 & 2 \end{pmatrix}$

9. Find the inverse of  $\begin{pmatrix} 1 & 0 & 1 \\ 3 & 1 & 0 \\ 4 & 2 & 1 \end{pmatrix}$

10. Find the area of the parallelogram in  $\mathbb{R}^5$  generated by  $(1, 2, 3, 4)$  and  $(0, 1, -1, 0)$ .

11. Find the volume of the 4-box generated by  $(1, 1, 2, 1), (2, 1, 0, 0), (1, 0, 0, 3), (0, 1, 2, 5)$

12. Find the area of the image of the triangle generated by  $(1, 2), (3, 1)$  and  $(0, -1)$  under the map  $T(x, y) = (2x + 3y, 4x, 2y)$ .