

Question1) Let

$$A = \begin{bmatrix} 1 & -2 & 3 \\ 6 & 7 & -1 \\ -3 & 1 & 4 \end{bmatrix}$$

Find all the minors and cofactors.

Question2) Let

$$A = \begin{bmatrix} 4 & -1 & 1 & 6 \\ 0 & 0 & -3 & 3 \\ 4 & 1 & 0 & 14 \\ 4 & 1 & 3 & 2 \end{bmatrix}$$

Find $C_{13}, C_{23}, C_{22}, C_{21}$.**Question3)** Evaluate the determinant $\det(A)$ by a cofactor expansion along a row or column of your choice.

$$\text{a) } \begin{bmatrix} -3 & 0 & 7 \\ 2 & 5 & 1 \\ -1 & 0 & 5 \end{bmatrix} \quad \text{b) } \begin{bmatrix} 3 & 3 & 1 \\ 1 & 0 & -4 \\ 1 & -3 & 5 \end{bmatrix} \quad \text{c) } \begin{bmatrix} 3 & 3 & 0 & 5 \\ 2 & 2 & 0 & -2 \\ 4 & 1 & -3 & 0 \\ 2 & 10 & 3 & 2 \end{bmatrix}$$

Question4) Use the cofactor to find A^{-1} .

$$\text{a) } A = \begin{bmatrix} 2 & 5 & 5 \\ -1 & -1 & 0 \\ 2 & 4 & 3 \end{bmatrix} \quad \text{b) } A = \begin{bmatrix} 2 & -3 & 5 \\ 0 & 1 & -3 \\ 0 & 0 & 2 \end{bmatrix} \quad \text{c) } A = \begin{bmatrix} 2 & 0 & 0 \\ 8 & 1 & 0 \\ -5 & 3 & 6 \end{bmatrix}$$

Question5) Solve by Cramer's Rule, where it applies.

$$\begin{array}{l} a) \begin{array}{l} 7x_1 - 2x_2 = 3 \\ 3x_1 + x_2 = 5 \end{array} \\ b) \begin{array}{l} 4x + 5y = 2 \\ 11x + y + 2z = 3 \\ x + 5y + 2z = 1 \end{array} \\ c) \begin{array}{l} x_1 - 3x_2 + x_3 = 4 \\ 2x_1 - x_2 = -2 \\ 4x_1 - 3x_3 = 0 \end{array} \end{array}$$

Question6) Show that the matrix

$$A = \begin{bmatrix} \cos \theta & \sin \theta & 0 \\ -\sin \theta & \cos \theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

is invertible for all values of θ , then find A^{-1} .

Question7) Use Cramer's Rule to solve for y without solving for x, z, and w.

$$\begin{array}{l} 4x + y + z + w = 6 \\ 3x + 7y - z + w = 1 \\ 7x + 3y - 5z + 8w = -3 \\ x + y + z + 2w = 3 \end{array}$$