

Applications of Gaussian Elimination

Questions

For questions 1-6, find the inverse of the following matrices:

1.

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

2.

$$B = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$

3.

$$C = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 1 & 3 \\ 4 & -1 & 0 \end{bmatrix}$$

4.

$$D = \begin{bmatrix} 2 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$$

5.

$$E = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 2 & 0 & 0 & 1 \end{bmatrix}$$

6.

$$F = \begin{bmatrix} 2 & -1 & 0 & 0 \\ 1 & 2 & 1 & 0 \\ 0 & 1 & 2 & 1 \\ 0 & 0 & 1 & 2 \end{bmatrix}$$

For questions 7-12, solve the following systems of equations by writing the coefficients of the variables as a matrix A and finding the inverse of the matrix. 7. Solve the following systems of equations:

$$\begin{cases} x + 2y = 5, \\ 4x - y = 1. \end{cases}$$

8.

$$\begin{cases} x + y + z = 6, \\ 2x - y + 3z = 14, \\ -x + 4y - z = 2. \end{cases}$$

9.

$$\begin{cases} x - 2y + z = 3, \\ 3x + y - z = 2, \\ 2x - y + 4z = 8. \end{cases}$$

10.

$$\begin{cases} 2x + y - z + 3w = 4, \\ -x + 3y + 2z - w = 1, \\ 3x - 2y + z + w = 7, \\ x + y + z + w = 5. \end{cases}$$

11.

$$\begin{cases} x + 2y + 3z + w = 4, \\ 2x - y + z + 2w = 5, \\ -x + 3y - 2z + 4w = -1, \\ 3x + y + z - w = 6. \end{cases}$$

12.

$$\begin{cases} 3x - y = 7, \\ 2x + 4y = 10. \end{cases}$$