

Applied Data Analysis and Tools

Matrix Homework

Use MATLAB to answer the following questions. Copy and paste your session from the MATLAB Command Window into a text file, add the narrative answers, and the problems numbers. Submit the file on Canvas.

1. Perform matrix multiplication.

(a)

$$\begin{bmatrix} 9 & 10 & 3 \\ 10 & 7 & 6 \\ 2 & 1 & 10 \end{bmatrix} \begin{bmatrix} 0 & 5 & 1 \\ 1 & -2 & 3 \\ 5 & 5 & 0 \end{bmatrix}$$

(b)

$$\begin{bmatrix} 3 & 8 \\ 4 & 2 \end{bmatrix} \begin{bmatrix} -2 & 1 \\ 7 & 5 \end{bmatrix}$$

(c)

$$\begin{bmatrix} 9 & 10 & 3 \\ 10 & 7 & 6 \\ 2 & 1 & 10 \end{bmatrix} \begin{bmatrix} 5 \\ 2 \\ 1 \end{bmatrix}$$

2. Consider the matrix:

$$\mathbf{B} = \begin{bmatrix} -1 & -4 & -1 \\ 0 & 0 & -1 \\ -1 & 0 & -1 \end{bmatrix}$$

(a) What is the determinant of \mathbf{B} ?

(b) Is the matrix singular? If not, what is its inverse?

3. Consider the system of linear equations:

$$\begin{cases} 8x + 9y & = & 5 \\ 9x + 5y + 4z & = & -3 \\ -3x - 3y + 10z & = & 5 \end{cases}$$

(a) Make matrices for \mathbf{A} and \mathbf{b} such that the system of equations can be expressed as a matrix equation in the form $\mathbf{A}\mathbf{x} = \mathbf{b}$.

(b) Is matrix \mathbf{A} full rank? Based on the rank, does this matrix equation have a solution for $\mathbf{x} = (x, y, z)$?

(c) Use MATLAB's left-divide operator to determine the $\mathbf{x} = (x, y, z)$ vector that satisfies $\mathbf{A}\mathbf{x} = \mathbf{b}$.