

Math 4133 - Linear Algebra

Quiz #5 - 2014.02.07

Solutions

Consider the matrix:

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

1. Compute the determinant of A along any row or column except row 1.

We will expand along the last column where only the last entry is nonzero. We get

$$\begin{aligned} \det(A) &= (-1)^{3+3} \cdot \det\left(\begin{bmatrix} 1 & 3 \\ -3 & 1 \end{bmatrix}\right) \\ &= 1 \cdot (1 + 9) = 10 \end{aligned}$$

2. Based on your answer to problem 1, is A invertible?

A is invertible since $\det(A) \neq 0$.

3. Compute $M_{2,3}$.

The minor corresponding to row 2 and column 3 of A is the determinant of the 2×2 matrix found by removing row 2 and column 3 of A . Thus

$$\begin{aligned} M_{2,3} &= \det\left(\begin{bmatrix} 1 & 3 \\ 4 & 3 \end{bmatrix}\right) \\ &= 3 - 12 = -9 \end{aligned}$$