

Math 4133 - Linear Algebra

Quiz #4 - 2014.01.31

Solutions

Consider the following matrices:

$$E_1 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -5 \end{bmatrix}, \quad E_2 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 4 & 0 & 1 \end{bmatrix}$$

1. If $A \in \mathbb{R}^{3 \times 4}$, what will left matrix multiplication by E_1 do to A ?

Left multiplication by E_1 will result in a matrix whose rows are identical to those of A except for the last row, row 3, which will be -5 times row 3 of A .

2. If $A \in \mathbb{R}^{3 \times 4}$, what will left matrix multiplication by E_2 do to A ?

Left multiplication by E_2 will result in a matrix whose rows are identical to those of A except for the last row, row 3, which will now be 4 times row 1 added to row 3 of A .

3. Which of the following matrices will have an inverse?

$$B = \begin{bmatrix} -1 & 2 \\ -2 & 3 \end{bmatrix}, \quad C = \begin{bmatrix} -1 & 2 \\ 1 & -2 \end{bmatrix}, \quad D = \begin{bmatrix} -1 & 0 \\ 5 & 0 \end{bmatrix}$$

The determinants of C and D are zero, while the determinant of B is 1. Thus the only matrix which has an inverse is B .