

MATH 110 Lecture Notes 9

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1 Elementary Matrices

There are three types of elementary row operations:

1. interchanging two rows
2. multiplying a row by a nonzero scalar
3. adding a multiple of a row to some other row

We can show that these operations are performed by multiplication on the left by a square matrix using the following characterization of matrix multiplication:

$$A(\mathbf{b}_1 \mid \mathbf{b}_2 \mid \cdots \mid \mathbf{b}_n) = (A\mathbf{b}_1 \mid A\mathbf{b}_2 \mid \cdots \mid A\mathbf{b}_n).$$

There are corresponding columns operations which are performed by multiplication on the right, which we

can show using the fact that $(AB)^t = B^t A^t$.

All elementary matrices are invertible.