

MATH 54 Lecture Notes 3

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1 Inverses and Elementary Matrices

- If A is invertible, then so is A^{-1} , and $(A^{-1})^{-1} = A$.
- To find the elementary matrix that performs a given row operation or series of row operations, simply perform those row operations on the identity matrix I .

2 Transposes and Symmetric Matrices

Let A be an $n \times n$ matrix, where a_{ij} is the entry in the i -th row and j -th column. Then the *transpose* of A , written A^T , is the $n \times n$ matrix where a_{ji} is the entry in the i -th row and j -th column. Some facts about transposes:

- $(A^T)^T = A$
- $(A + B)^T = A^T + B^T$
- $(AB)^T = B^T A^T$
- A is invertible if and only if A^T is. If they are both invertible, then $(A^T)^{-1} = (A^{-1})^T$.

A matrix A is called *symmetric* if $A^T = A$.