Matrix Operations: Inverting Matrices Efficiently

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**What is Matrix Inversion?**

Given a square matrix A, its inverse A -1  is the unique matrix that satisfies:



Where I is the identity matrix.

Ex.

2\*2 Matrix Inversion: Test for A\* A-1

A = ->  =

A -1 =  =

=   =

**Importance of Matrix Inversion**

Matrix inversion is fundamentally about solving equations involving matrices.

**Ex. Ax=b**

**To find the unknown vector x, you can multiply both sides of the equation:**

**x=A−1b**

Matrix inversion is crucial for solving systems of linear equations, and is widely applied in:

* **Engineering:** Structural analysis, circuit theory, **Computer Graphics:** Geometric transformations, **Machine Learning:** Linear regression, neural networks

**Gauss-Jordan Elimination Method**

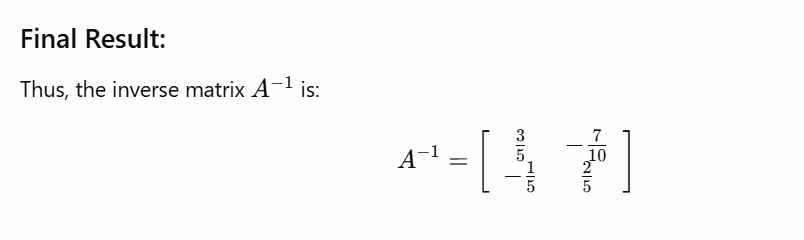
Gauss-Jordan elimination systematically transforms to find the inverse :

**Steps:**

1. Write augmented matrix [A] [I]
2. Use row operations to convert A into identity matrix.
3. Transformed identity matrix I becomes A -1.

**Example Problem:**

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