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# Inverse and Transpose

The **inverse** of a matrix  $A$  is denoted  $A^{-1}$ . Multiplying by the inverse results in the identity matrix.

A non square matrix does not have an inverse matrix. We can compute inverses of matrices in octave with the  $\text{pinv}(A)$  function and in Matlab with the  $\text{inv}(A)$  function. Matrices that don't have an inverse are *singular* or *degenerate*.

The **transposition** of a matrix is like rotating the matrix  $90^\circ$  in clockwise direction and then reversing it. We can compute transposition of matrices in matlab with the  $\text{transpose}(A)$  function or  $A'$ :

$$A = \begin{bmatrix} a & b \\ c & d \\ e & f \end{bmatrix}$$

$$A^T = \begin{bmatrix} a & c & e \\ b & d & f \end{bmatrix}$$

In other words:

$$A_{ij} = A_{ji}^T$$

```
1 % Initialize matrix A
2 A = [1,2,0;0,5,6;7,0,9]
3
4 % Transpose A
5 A_trans = A'
6
7 % Take the inverse of A
8 A_inv = inv(A)
9
10 % What is A^(-1)*A?
11 A_invA = inv(A)*A
12
13
```

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