Identity and Inverse Matrices

square
$n \times n$ identity matrix - the matrix that has 1's on the main diagonal and 0's elsewhere.

$$I_{2x2} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \qquad I_{3x3} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

☆ **If A is any nxn matrix and I is the n xn identity matrix, then IA=A and AI=A.**

☆ **If B is any m xn matrix, then $I_{mxm}B=B$ and $BI_{nxn} = B$.**

The Inverse of a 2x2 Matrix:

If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$,

switch entries

take opposite sign

then $A^{-1} = \dfrac{1}{|A|}\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$, provided $|A| \neq 0$.

determinant of A

Ex 1. Find each inverse:

a. $A = \begin{bmatrix} 3 & 1 \\ 4 & 2 \end{bmatrix}$

$|A| = 6 - 4 = 2$

$A^{-1} = \frac{1}{2}\begin{bmatrix} 2 & -1 \\ -4 & 3 \end{bmatrix}$

$A^{-1} = \begin{bmatrix} 1 & -\frac{1}{2} \\ -2 & \frac{3}{2} \end{bmatrix}$

b. $A = \begin{bmatrix} 6 & 1 \\ -8 & -2 \end{bmatrix}$

$|A| = -12 - (-8) = -4$

$A^{-1} = \frac{1}{-4}\begin{bmatrix} -2 & -1 \\ 8 & 6 \end{bmatrix}$

$A^{-1} = \begin{bmatrix} \frac{1}{2} & \frac{1}{4} \\ -2 & -\frac{3}{2} \end{bmatrix}$