

MATRIX:  $A$   
INVERSE:  $A^{-1}$

$$A A^{-1} = I$$
$$A^{-1} A = I$$

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

1.  $A = \begin{bmatrix} 2 & -3 \\ 1 & 4 \end{bmatrix}$   $B = \begin{bmatrix} 7 & -1 \\ 5 & 9 \end{bmatrix}$

$$AB = \begin{bmatrix} 2(7) - 3(5) & 2(-1) - 3(9) \\ 1(7) + 4(5) & 1(-1) + 4(9) \end{bmatrix}$$
$$= \begin{bmatrix} -1 & -29 \\ 27 & 35 \end{bmatrix} \quad \text{NO}$$

2.  $A = \begin{bmatrix} 7 & -4 \\ -2 & 3 \end{bmatrix}$   $B = \begin{bmatrix} \frac{3}{13} & \frac{4}{13} \\ \frac{2}{13} & \frac{7}{13} \end{bmatrix}$

$$AB = \begin{bmatrix} 7\left(\frac{3}{13}\right) - 4\left(\frac{2}{13}\right) & 7\left(\frac{4}{13}\right) - 4\left(\frac{7}{13}\right) \\ -2\left(\frac{3}{13}\right) + 3\left(\frac{2}{13}\right) & -2\left(\frac{4}{13}\right) + 3\left(\frac{7}{13}\right) \end{bmatrix}$$
$$= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad \checkmark$$

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

$a=3$   $b=-2$   $c=4$   $d=1$

$$A^{-1} = \frac{1}{ad-bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

$$= \frac{1}{3(1) - (-2)(4)} \begin{bmatrix} 1 & -(-2) \\ -4 & 3 \end{bmatrix}$$

$$= \frac{1}{3+8} \begin{bmatrix} 1 & 2 \\ -4 & 3 \end{bmatrix}$$

$$= \frac{1}{11} \begin{bmatrix} 1 & 2 \\ -4 & 3 \end{bmatrix}$$

$$= \begin{bmatrix} \frac{1}{11} & \frac{2}{11} \\ -\frac{4}{11} & \frac{3}{11} \end{bmatrix}$$

$$BA = \begin{bmatrix} \frac{3}{13}(7) + \frac{4}{13}(-2) & \frac{3}{13}(-4) + \frac{4}{13}(3) \\ \frac{2}{13}(7) + \frac{7}{13}(-2) & \frac{2}{13}(-4) + \frac{7}{13}(3) \end{bmatrix}$$
$$= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad \checkmark \quad \text{YES}$$