

Pre-quiz

Review Problem Set

Answer

key

1.)

$A =$

$$\begin{bmatrix} 3 & 7 & 1 \\ -8 & 1 & 0 \\ 4 & 5 & 1 \end{bmatrix}$$

$B =$

$$\begin{bmatrix} 1 & 3 & 0 \\ 0 & -4 & 0 \\ 2 & 0 & 1 \end{bmatrix}$$

c)

$$2B = 2 \begin{bmatrix} 1 & 3 & 0 \\ 0 & -4 & 0 \\ 2 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 2 & 6 & 0 \\ 0 & -8 & 0 \\ 4 & 0 & 2 \end{bmatrix} \checkmark$$

b)

$$A + B = \begin{bmatrix} 3+1 & 7+3 & 1+0 \\ -8+0 & 1+(-4) & 0+0 \\ 4+2 & 5+0 & 1+1 \end{bmatrix} = \begin{bmatrix} 4 & 11 & 1 \\ -8 & -3 & 0 \\ 6 & 5 & 2 \end{bmatrix} \checkmark$$

$$c) 2(A B) - B$$

$$A B = \begin{bmatrix} 3(1) + 7(0) + 1(2) & 3(3) + 7(-4) + 1(0) & 3(0) + 7(0) + 1(1) \\ -8(1) + 1(0) + 0(2) & -8(3) + 1(-4) + 0(0) & -8(0) + 1(0) + 0(1) \\ 4(1) + 5(0) + 1(2) & 4(3) + 5(-4) + 1(0) & 4(0) + 5(0) + 1(1) \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 5 & -19 & 1 \\ -8 & -28 & 0 \\ 6 & -8 & 1 \end{bmatrix} = A B$$

$$\downarrow$$

$$2 A B - B =$$

$$\begin{bmatrix} 10 & -38 & 2 \\ -16 & -56 & 0 \\ 12 & -16 & 2 \end{bmatrix} - \begin{bmatrix} 1 & 3 & 0 \\ 0 & -4 & 0 \\ 2 & 0 & 1 \end{bmatrix} =$$

$$\begin{bmatrix} 11 & -41 & 2 \\ -16 & -52 & 0 \\ 14 & -16 & 1 \end{bmatrix} \quad \checkmark$$

2a) X and Y must have the same dimensions. So if X has dimensions $m \times n$, then so must Y .

b) X must have the same number of columns as Y has rows. So if X has dimensions $m \times n$ then Y 's dimension must be $n \times p$.

$$7x + 3y = 2$$

$$9x + 4y = 0$$

i)

$$\begin{matrix} A & X & B \\ \begin{bmatrix} 7 & 3 \\ 9 & 4 \end{bmatrix} & \begin{bmatrix} x \\ y \end{bmatrix} & = \begin{bmatrix} 2 \\ 0 \end{bmatrix} \end{matrix}$$

ii)

$$A^{-1} = \frac{1}{7 \cdot 4 - 3 \cdot 9} \begin{bmatrix} 4 & -3 \\ -9 & 7 \end{bmatrix} = \frac{1}{1} \begin{bmatrix} 4 & -3 \\ -9 & 7 \end{bmatrix}$$

$$= \begin{bmatrix} 4 & -3 \\ -9 & 7 \end{bmatrix}$$

iii) $X = A^{-1} B$

$$= \begin{bmatrix} 4 & -3 \\ -9 & 7 \end{bmatrix} \begin{bmatrix} 2 \\ 0 \end{bmatrix}$$

$$= \begin{bmatrix} 4(2) + -3(0) \\ -9(2) + 7(0) \end{bmatrix} = \begin{bmatrix} 8 \\ -18 \end{bmatrix}$$

$x = 8, y = -18$ ✓