

3-5 Practice

Operations with Matrices

Use the following matrix for questions 1-4

$$M = \begin{bmatrix} 10 & -8 & 6 \\ -6 & -4 & 20 \\ 2 & -1 & 3 \end{bmatrix}$$

+790

1) What are the dimensions of the matrix?

$$R \times C \\ 3 \times 3$$

2) What is the address of 20 in matrix M?

3) What is the entry at address m_{13} ?

$$m_{23} \\ 6$$

4) What is the entry at address m_{31} ?

$$2$$

Perform the indicated operations. If the matrix does not exist, write *impossible*.

$$5. \begin{bmatrix} 2 & -1 \\ 3 & 7 \\ 14 & -9 \end{bmatrix} + \begin{bmatrix} -6 & 9 \\ 7 & -11 \\ -8 & 17 \end{bmatrix} =$$

$$\begin{bmatrix} 2+(-6) & -1+9 \\ 3+7 & 7+(-11) \\ 14-8 & -9+17 \end{bmatrix} = \begin{bmatrix} -4 & 8 \\ 10 & -4 \\ 6 & 8 \end{bmatrix}$$

$$6. \begin{bmatrix} 4 \\ -71 \\ 18 \end{bmatrix} - \begin{bmatrix} -67 \\ 45 \\ -24 \end{bmatrix} =$$

$$\begin{bmatrix} 4+67 \\ -71-45 \\ 18+24 \end{bmatrix} = \begin{bmatrix} 71 \\ -116 \\ 42 \end{bmatrix}$$

$$7. -3 \begin{bmatrix} -1 & 0 \\ 17 & -11 \end{bmatrix} + 4 \begin{bmatrix} -3 & 16 \\ -21 & 12 \end{bmatrix}$$

$$\begin{bmatrix} 3 & 0 \\ -51 & 33 \end{bmatrix} + \begin{bmatrix} -12 & 64 \\ -84 & 48 \end{bmatrix} = \begin{bmatrix} -9 & 64 \\ -135 & 81 \end{bmatrix}$$

$$8. 7 \begin{bmatrix} 2 & -1 & 8 \\ 4 & 7 & 9 \end{bmatrix} + 2 \begin{bmatrix} -1 & 4 & -3 \\ 7 & 2 & -6 \end{bmatrix}$$

$$\begin{bmatrix} 14 & -7 & 48 \\ 28 & 49 & 63 \end{bmatrix} + \begin{bmatrix} 2 & -8 & 6 \\ -14 & -4 & 12 \end{bmatrix} =$$

$$9. -2 \begin{bmatrix} 1 \\ 2 \end{bmatrix} + 4 \begin{bmatrix} 0 \\ 5 \end{bmatrix} - \begin{bmatrix} 10 \\ 18 \end{bmatrix}$$

$$\begin{bmatrix} -2 \\ -4 \end{bmatrix} + \begin{bmatrix} 0 \\ 20 \end{bmatrix} - \begin{bmatrix} 10 \\ 18 \end{bmatrix} = \begin{bmatrix} -12 \\ -2 \end{bmatrix}$$

$$10. \frac{3}{4} \begin{bmatrix} 8 & 12 \\ -16 & 20 \end{bmatrix} + \frac{2}{3} \begin{bmatrix} 27 & -9 \\ 54 & -18 \end{bmatrix} = \begin{bmatrix} 16 & -15 & 54 \\ 14 & 45 & 75 \end{bmatrix}$$

$$\begin{bmatrix} 6 & 9 \\ -12 & 15 \end{bmatrix} + \begin{bmatrix} 18 & -6 \\ 36 & -12 \end{bmatrix} =$$

$$\begin{bmatrix} 24 & 3 \\ 24 & 3 \end{bmatrix}$$

NAME _____

DATE

$$\begin{bmatrix} 9 & -5 & -7 \\ -6 & 4 & 12 \end{bmatrix}$$

PERIOD _____

Use matrices $A = \begin{bmatrix} 4 & -1 & 0 \\ -3 & 6 & 2 \end{bmatrix}$, $B = \begin{bmatrix} -2 & 4 & 5 \\ 1 & 0 & 9 \end{bmatrix}$, and $C = \begin{bmatrix} 10 & -8 & 6 \\ -6 & -4 & 20 \end{bmatrix}$ to find the following.

11. $A - B$

$$\begin{bmatrix} 4 & -1 & 0 \\ -3 & 6 & 2 \end{bmatrix} - \begin{bmatrix} -2 & 4 & 5 \\ 1 & 0 & 9 \end{bmatrix}$$

$$\begin{bmatrix} 6 & -5 & -5 \\ -4 & 6 & -7 \end{bmatrix}$$

13. $-3B$

$$-3 \begin{bmatrix} -2 & 4 & 5 \\ 1 & 0 & 9 \end{bmatrix}$$

$$\begin{bmatrix} 6 & -12 & -15 \\ -3 & 0 & -27 \end{bmatrix}$$

15. $-2B - 3C$

$$-2 \begin{bmatrix} -2 & 4 & 5 \\ 1 & 0 & 9 \end{bmatrix} + -3 \begin{bmatrix} 10 & -8 & 6 \\ -6 & -4 & 20 \end{bmatrix}$$

$$\begin{bmatrix} 4 & -8 & -10 \\ -2 & 0 & -18 \end{bmatrix} + \begin{bmatrix} -30 & 24 & -18 \\ 18 & 12 & -60 \end{bmatrix} = \begin{bmatrix} -26 & 16 & -28 \\ 16 & 12 & -78 \end{bmatrix}$$

12. $A - C$

$$\begin{bmatrix} 4 & -1 & 0 \\ 3 & 6 & 2 \end{bmatrix} - \begin{bmatrix} 10 & -8 & 6 \\ -6 & -4 & 20 \end{bmatrix}$$

$$\begin{bmatrix} -6 & 7 & -6 \\ 9 & 10 & -18 \end{bmatrix}$$

14. $4B - A$

$$4 \begin{bmatrix} -2 & 4 & 5 \\ 1 & 0 & 9 \end{bmatrix} - \begin{bmatrix} 4 & -1 & 0 \\ -3 & 6 & 2 \end{bmatrix}$$

16. $A + 0.5C$

$$\begin{bmatrix} 4 & -1 & 0 \\ -3 & 6 & 2 \end{bmatrix} + \frac{1}{2} \begin{bmatrix} 10 & -8 & 6 \\ -6 & -4 & 20 \end{bmatrix}$$

$$\begin{bmatrix} 4 & -1 & 0 \\ -3 & 6 & 2 \end{bmatrix} + \begin{bmatrix} 5 & -4 & 3 \\ -3 & -2 & 10 \end{bmatrix}$$

See top matrix

17. **ECONOMICS** Use the table that shows loans by an economic development board to women and men starting new businesses.

a. Write two matrices that represent the number of new businesses and loan amounts, one for women and one for men.

women

$$\begin{bmatrix} 27 & 567,000 \\ 41 & 902,000 \\ 35 & 777,000 \end{bmatrix}$$

men

$$\begin{bmatrix} 36 & 864,000 \\ 32 & 672,000 \\ 28 & 562,000 \end{bmatrix}$$

	Women		Men	
	Businesses	Loan Amount (\$)	Businesses	Loan Amount (\$)
2003	27	\$567,000	36	\$864,000
2004	41	\$902,000	32	\$672,000
2005	35	\$777,000	28	\$562,000

b. Find the sum of the numbers of new businesses and loan amounts for both men and women over the three-year period expressed as a matrix.

$$\begin{bmatrix} 27 + 36 & 567,000 + 864,000 \\ 41 + 32 & 902,000 + 672,000 \\ 35 + 28 & 777,000 + 562,000 \end{bmatrix} = \begin{bmatrix} 63 & 1,431,000 \\ 73 & 1,574,000 \\ 63 & 1,339,000 \end{bmatrix}$$