

**Exercises**  
(courtesy of our textbook)

In Exercises 1–4, find  $x$  and  $y$ .

$$1. \begin{bmatrix} x & -2 \\ 7 & y \end{bmatrix} = \begin{bmatrix} -4 & -2 \\ 7 & 22 \end{bmatrix}$$

$$2. \begin{bmatrix} -5 & x \\ y & 8 \end{bmatrix} = \begin{bmatrix} -5 & 13 \\ 12 & 8 \end{bmatrix}$$

$$3. \begin{bmatrix} 16 & 4 & 5 & 4 \\ -3 & 13 & 15 & 6 \\ 0 & 2 & 4 & 0 \end{bmatrix} = \begin{bmatrix} 16 & 4 & 2x+1 & 4 \\ -3 & 13 & 15 & 3x \\ 0 & 2 & 3y-5 & 0 \end{bmatrix}$$

$$4. \begin{bmatrix} x+2 & 8 & -3 \\ 1 & 2y & 2x \\ 7 & -2 & y+2 \end{bmatrix} = \begin{bmatrix} 2x+6 & 8 & -3 \\ 1 & 18 & -8 \\ 7 & -2 & 11 \end{bmatrix}$$

In Exercises 5–10, find (a)  $A + B$ , (b)  $A - B$ , (c)  $3A$ , and (d)  $3A - 2B$ .

$$5. A = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}, B = \begin{bmatrix} 2 & -1 \\ -1 & 8 \end{bmatrix}$$

$$6. A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}, B = \begin{bmatrix} -3 & -2 \\ 4 & 2 \end{bmatrix}$$

$$7. A = \begin{bmatrix} 6 & -1 \\ 2 & 4 \\ -3 & 5 \end{bmatrix}, B = \begin{bmatrix} 1 & 4 \\ -1 & 5 \\ 1 & 10 \end{bmatrix}$$

$$8. A = \begin{bmatrix} 2 & 1 & 1 \\ -1 & -1 & 4 \end{bmatrix}, B = \begin{bmatrix} 2 & -3 & 4 \\ -3 & 1 & -2 \end{bmatrix}$$

$$9. A = \begin{bmatrix} 2 & 2 & -1 & 0 & 1 \\ 1 & 1 & -2 & 0 & -1 \end{bmatrix},$$

$$B = \begin{bmatrix} 1 & 1 & -1 & 1 & 0 \\ -3 & 4 & 9 & -6 & -7 \end{bmatrix}$$

$$10. A = \begin{bmatrix} 3 \\ 2 \\ -1 \end{bmatrix}, B = \begin{bmatrix} -4 \\ 6 \\ 2 \end{bmatrix}$$

In Exercises 11–14, solve for  $X$  given

$$A = \begin{bmatrix} -2 & -1 \\ 1 & 0 \\ 3 & -4 \end{bmatrix} \text{ and } B = \begin{bmatrix} 0 & 3 \\ 2 & 0 \\ -4 & -1 \end{bmatrix}.$$

$$11. X = 3A - 2B$$

$$12. 2X = 2A - B$$

$$13. 2X + 3A = B$$

$$14. 2A + 4B = -2X$$

In Exercises 15–20, find (a)  $AB$ , (b)  $BA$ , and, if possible, (c)  $A^2$ . (Note:  $A^2 = AA$ .)

$$15. A = \begin{bmatrix} 1 & 2 \\ 4 & 2 \end{bmatrix}, B = \begin{bmatrix} 2 & -1 \\ -1 & 8 \end{bmatrix}$$

$$16. A = \begin{bmatrix} 2 & -1 \\ 1 & 4 \end{bmatrix}, B = \begin{bmatrix} 0 & 0 \\ 3 & -3 \end{bmatrix}$$

$$17. A = \begin{bmatrix} 3 & -1 \\ 1 & 3 \end{bmatrix}, B = \begin{bmatrix} 1 & -3 \\ 3 & 1 \end{bmatrix}$$

$$18. A = \begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}, B = \begin{bmatrix} 1 & 3 \\ -3 & 1 \end{bmatrix}$$

$$19. A = \begin{bmatrix} 1 & -1 & 7 \\ 2 & -1 & 8 \\ 3 & 1 & -1 \end{bmatrix}, B = \begin{bmatrix} 1 & 1 & 2 \\ 2 & 1 & 1 \\ 1 & -3 & 2 \end{bmatrix}$$

$$20. A = [3 \quad 2 \quad 1], B = \begin{bmatrix} 2 \\ 3 \\ 0 \end{bmatrix}$$

In Exercises 21–28, find  $AB$ , if possible.

$$21. A = \begin{bmatrix} 2 & 1 \\ -3 & 4 \\ 1 & 6 \end{bmatrix}, B = \begin{bmatrix} 0 & -1 & 0 \\ 4 & 0 & 2 \\ 8 & -1 & 7 \end{bmatrix}$$

$$22. A = \begin{bmatrix} 0 & -1 & 0 \\ 4 & 0 & 2 \\ 8 & -1 & 7 \end{bmatrix}, B = \begin{bmatrix} 2 & 1 \\ -3 & 4 \\ 1 & 6 \end{bmatrix}$$

$$23. A = \begin{bmatrix} -1 & 3 \\ 4 & -5 \\ 0 & 2 \end{bmatrix}, B = \begin{bmatrix} 1 & 2 \\ 0 & 7 \end{bmatrix}$$

$$24. A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & -2 \end{bmatrix}, B = \begin{bmatrix} 3 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 5 \end{bmatrix}$$

$$25. A = \begin{bmatrix} 5 & 0 & 0 \\ 0 & -8 & 0 \\ 0 & 0 & 7 \end{bmatrix}, B = \begin{bmatrix} \frac{1}{5} & 0 & 0 \\ 0 & -\frac{1}{8} & 0 \\ 0 & 0 & \frac{1}{2} \end{bmatrix}$$

$$26. A = \begin{bmatrix} 10 \\ 12 \end{bmatrix}, B = [6 \quad -2 \quad 1 \quad 6]$$

$$27. A = \begin{bmatrix} 0 & 0 & 5 \\ 0 & 0 & -3 \\ 0 & 0 & 4 \end{bmatrix}, B = \begin{bmatrix} 6 & -11 & 4 \\ 8 & 16 & 4 \\ 0 & 0 & 0 \end{bmatrix}$$

$$28. A = \begin{bmatrix} 1 & 0 & 3 & -2 \\ 6 & 13 & 8 & -17 \end{bmatrix}, B = \begin{bmatrix} 1 & 6 \\ 4 & 2 \end{bmatrix}$$