

Lesson 8-5

Example 1

- a. Find the dimensions of matrix B .
- b. Identify the elements B_{23} , B_{12} , and B_{34} .

$$B = \begin{bmatrix} -5 & 0 & 13 & 8 \\ 6 & 14 & -3 & 1 \\ 16 & 7 & 6 & -2 \end{bmatrix}$$

Solution

- a. B has 3 rows and 4 columns. So, B is a 3 \times 4 matrix.
- b. B_{23} means element in row 2, column 3.
 $B_{23} = -3$, $B_{12} = 0$, $B_{34} = -2$

Example 2

Find the sum of the matrices shown.

$$A = \begin{bmatrix} 5 & 2 & 23 & 18 \\ 7 & 14 & 3 & 11 \\ 16 & 7 & 9 & 12 \end{bmatrix}$$

$$B = \begin{bmatrix} 4 & 10 & 23 & 7 \\ 13 & 4 & 7 & 13 \\ 0 & 15 & 8 & 5 \end{bmatrix}$$

Solution

$$A + B = \begin{bmatrix} 5+4 & 2+10 & 23+23 & 18+7 \\ 7+13 & 14+4 & 3+7 & 11+13 \\ 16+0 & 7+15 & 9+8 & 12+5 \end{bmatrix} = \begin{bmatrix} 9 & 12 & 46 & 25 \\ 20 & 18 & 10 & 24 \\ 16 & 22 & 17 & 17 \end{bmatrix}$$

Example 3

CRYPTOGRAPHY The matrix below represents numerical information that must be transmitted electronically. As the first step in encrypting the information, the matrix is multiplied by 4.

Find the product: $4 \begin{bmatrix} -2 & 3 & 4 \\ 0 & -1 & 6 \\ 8 & 3 & 5 \end{bmatrix}$

Solution

Every element in the matrix must be multiplied by 4.

$$4 \begin{bmatrix} -2 & 3 & 4 \\ 0 & -1 & 6 \\ 8 & 3 & 5 \end{bmatrix} = \begin{bmatrix} 4 \cdot (-2) & 4 \cdot 3 & 4 \cdot 4 \\ 4 \cdot 0 & 4 \cdot (-1) & 4 \cdot 6 \\ 4 \cdot 8 & 4 \cdot 3 & 4 \cdot 5 \end{bmatrix} = \begin{bmatrix} -8 & 12 & 16 \\ 0 & -4 & 24 \\ 32 & 12 & 20 \end{bmatrix}$$