

# Introduction to Matrices

A **matrix** is a rectangular array of numbers written within brackets.

A matrix is identified by a capital letter. A matrix is classified by its dimensions—the number of columns and rows it contains.

Matrix  $X$  to the right has 3 rows and 2 columns. It is a  $3 \times 2$  matrix.

$$X = \begin{bmatrix} 29,300 & 2,900 \\ 23,200 & 2,100 \\ 15,400 & 1,200 \end{bmatrix}$$

element  $X_{12}$   
 3 rows  
 2 columns

A **matrix element** is a number in the matrix.

Each matrix element is identified by its location within the matrix.

### Rules for Reading a Matrix

1. The dimensions of a matrix are given in terms of rows and columns.
2. A matrix element is identified by (1) using the letter of the matrix, and (2) using a subscript to identify the position of the element by row and column.

### Example

**State the dimensions of the matrix. Identify element  $A_{23}$ .**  $A = \begin{bmatrix} 4 & 5 & 6 \\ -1 & 0 & 2 \end{bmatrix}$

**Step 1** The dimensions of a matrix are given in terms of rows and columns.

The matrix has 2 rows and 3 columns; it is a  $2 \times 3$  matrix.

**Step 2** A matrix element is identified by (1) using the letter of the matrix, and (2) using a subscript to identify the position of the element by the row and column.

$A_{23}$  is the element in row 2, column 3.  $A_{23} = 2$

### Practice A

**State the dimensions of the matrix. Identify the specified element.**

1. Identify element  $B_{22}$ .

The dimensions of a matrix are given in terms of rows and columns.

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

The matrix has \_\_\_\_\_ rows and \_\_\_\_\_ columns; it is a \_\_\_\_\_ matrix.

A matrix element is identified by (1) using the letter of the matrix, and (2) using a subscript to identify the position of the element by the row and column.

$B_{22}$  is the element in row \_\_\_\_\_, column \_\_\_\_\_.  $B_{22} =$  \_\_\_\_\_

2. Identify element  $Z_{21}$ .  $Z = \begin{bmatrix} 10 & 0 \\ -2 & 1 \end{bmatrix}$  \_\_\_\_\_

3. Identify the location of  $-10$ .  $Z = \begin{bmatrix} 0 & -1 & -4 & 5 \\ 3 & 5 & -10 & 7 \\ 6 & -3 & -1 & 0 \end{bmatrix}$  \_\_\_\_\_