10-1 Additional Practice

Operations with Matrices

1. In matrix D, the entries represent the number of students in clubs in a high school. Column 1 lists the males and column 2 lists the females. Row 1 lists the number of students in the Spanish club, and row 2 lists the number of students in the French club. Find d_{11}, d_{21} and d_{12} and tell what each number represents.

$$D = \begin{bmatrix} 46 & 39 \\ 62 & 12 \end{bmatrix}$$

$d_{11} = 46$ = number of males in the Spanish club
$d_{21} = 62$ = number of males in the French club
$d_{12} = 39$ = number of females in the Spanish club

2. For matrix P, the rows represent the price of sweaters and pants. The columns represent the color scheme of black, blue and khaki. A black sweater costs \$45, a blue sweater costs \$60, and a khaki sweater costs \$25. The black pants cost \$30, the blue pants cost \$40, and the khaki pants cost \$20.

   a. Write matrix P to represent this scenario.

   $$P = \begin{bmatrix} 45 & 60 & 25 \\ 30 & 40 & 20 \end{bmatrix}$$

   b. The store is having a 35% off sale. Find the reduced price of each type of sweater and pants and write a new matrix that represents the sale prices.

   $$P = \begin{bmatrix} 29.25 & 39 & 16.25 \\ 19.50 & 26 & 13 \end{bmatrix}$$

For Items 3–5, find the sum or difference, if possible. If not possible, explain why.

$$P = \begin{bmatrix} 0 & 2 & 4 \\ 9 & 8 & 2 \end{bmatrix} \qquad Q = \begin{bmatrix} -2 & -4 & 1 \\ 9 & 7 & 0 \end{bmatrix} \qquad R = \begin{bmatrix} 4 & -1 & 0 \\ 2 & 3 & 5 \\ 0 & -6 & 1 \end{bmatrix}$$

3. $P + Q = \begin{bmatrix} -2 & -2 & 5 \\ 18 & 15 & 2 \end{bmatrix}$

4. $Q - P = \begin{bmatrix} -2 & -6 & -3 \\ 0 & -1 & -2 \end{bmatrix}$

5. $Q + R =$ **Not possible; they do not have the same dimensions.**

6. Find the additive inverse of the matrix $X = \begin{bmatrix} 2 & -5 \\ -6 & 3 \end{bmatrix}$. $X = \begin{bmatrix} -2 & 5 \\ 6 & -3 \end{bmatrix}$

7. $\overline{EF}$ has endpoints (2, 4) and (4, 5).

   a. Use matrices to translate $\overline{EF}$ 2 units right and 4 units down to $\overline{YZ}$. What are the coordinates of Y and Z? **Y: (4, 0); Z: (6, 1)**

   b. Use matrices to dilate $\overline{EF}$ to $\overline{UV}$ by a scale factor of 4, centered at the origin. What are the coordinates of U and V?
   U: (8, 16); V: (16, 20)