



SECTION 1.2: MATRIX MULTIPLICATION

- For the matrix product AB to exist the number of columns of matrix A must be the same as the number of rows of matrix B .
- Matrix multiplication is not commutative.

Pr 1. Use the given matrices $A, B, C, D, E,$ and F below, to compute each matrix product, if possible.

$$A = \begin{bmatrix} 7 & 2 & 4 \\ 6 & \frac{1}{5} & 0 \end{bmatrix} \quad 2 \times 3$$

$$B = \begin{bmatrix} -9 & 0 & 3 \end{bmatrix} \quad 1 \times 3$$

$$C = \begin{bmatrix} -2 & w \\ -y & 0 \\ 7 & (x+1) \end{bmatrix} \quad 3 \times 2$$

$$D = \begin{bmatrix} 1.4 & 3 \\ 7 & 15p \end{bmatrix} \quad 2 \times 2$$

$$E = \begin{bmatrix} v & 10 \\ 4m & -1 \end{bmatrix} \quad 2 \times 2$$

$$F = \begin{bmatrix} -2r \\ 6z \end{bmatrix} \quad 2 \times 1$$

a. DA $(2 \times 2)(2 \times 3) = 2 \times 3$

$$DA \Rightarrow \begin{bmatrix} 1.4 & 3 \\ 7 & 15p \end{bmatrix} \cdot \begin{bmatrix} 7 & 2 & 4 \\ 6 & \frac{1}{5} & 0 \end{bmatrix} = \begin{bmatrix} 1.4(7) + 3(6) & 1.4(2) + 3(\frac{1}{5}) & 1.4(4) + 3(0) \\ 7(7) + 15p(6) & 7(2) + 15p(\frac{1}{5}) & 7(4) + 15p(0) \end{bmatrix}$$

$$DA = \begin{bmatrix} 27.8 & 3.4 & 5.6 \\ (49+90p) & (3p+14) & 28 \end{bmatrix}$$

b. FC
 $(2 \times 1)(3 \times 2)$
 \neq

FC is not possible

c. $F^T E$

d. $-4BC$

$$A = \begin{bmatrix} 7 & 2 & 4 \\ 6 & \frac{1}{5} & 0 \end{bmatrix}$$

$$B = \begin{bmatrix} -9 & 0 & 3 \end{bmatrix}$$

$$C = \begin{bmatrix} -2 & w \\ -y & 0 \\ 7 & (x+1) \end{bmatrix}$$

$$D = \begin{bmatrix} 1.4 & 3 \\ 7 & 15p \end{bmatrix}$$

$$E = \begin{bmatrix} v & 10 \\ 4m & -1 \end{bmatrix}$$

$$F = \begin{bmatrix} -2r \\ 6z \end{bmatrix}$$

e. FBA^T

f. $BC + 10F^T$

g. $CE - A^T D$

h. If $L = CD$, determine l_{32} .

i. Find the value of each variable, given $Q = \begin{bmatrix} -23.8 & -6 \\ -7 & -15 \\ 72.8 & 21 \end{bmatrix}$ and $CD = Q$.

- Pr 2.** An online streaming service records the number of downloads based genre and media type. During the month of January 3000 science fiction novels, 4500 science fiction movies, 4200 thriller novels, 7000 thriller movies, 1200 romance novels, and 6800 romantic movies were downloaded, while in February the downloads were 3800, 2900, 2600, 5100, 4500, and 9700 respectively.
- a. If the online streaming service charges \$3.99 per movie download and \$7.99 per novel download, write a matrix for what the charges per download.

b. How much income does the online streaming service bring in, in January, for each genre?

c. How much income does the online streaming service bring in, for January and February combined, for each genre?

SECTION 2.1: REVIEW OF LINES

- Slope of a line between two points, $m = \frac{y_2 - y_1}{x_2 - x_1}$
- Equations of a Line,
 - Point-Slope Form: $y - y_1 = m(x - x_1)$
 - Slope-Intercept Form: $y = mx + b$
 - Standard Form: $Ax + BY = C$
 - Vertical Line: $x = a$
 - Horizontal Line: $y = b$
- Intercepts of a Line
 - x -intercept: $(x, 0)$
 - y -intercept: $(0, y)$
- Interpreting Change, $m = \frac{\Delta y}{\Delta x}$

Pr 1. Determine the slope between each of the given pair of points.

(a) $(3, -4)$ and $(-9, 11)$

(b) $(8, 10)$ and $(8, -13)$

(c) $(-3.6, 7.9)$ and $(1.4, 0)$

(d) $\left(\frac{3}{2}, \frac{2}{5}\right)$ and $\left(-\frac{7}{11}, \frac{2}{5}\right)$

Pr 2. Write the equation of the line given the slope which passes through the given point in the stated form.

(a) $m = \frac{3}{7}$ and $(-9, 11)$, in point-slope form

(b) $m = -\frac{5}{2}$ and $(4, -8)$, in slope-intercept form

(c) $m = \frac{7}{8}$ and $\left(\frac{8}{3}, 0\right)$, in standard form

(d) m is undefined and $\left(\frac{15}{19}, \frac{3}{40}\right)$, in standard form

(e) $m = 0$ and $(18, 20)$, in standard form

Pr 3. Write the equation of the line which passes through the given pair of points.

(a) $(3, -4)$ and $(-9, 11)$

(b) $(8, 10)$ and $(8, -13)$

(c) intersects the y -axis at $y = 8$ and the x -axis at $x = -6$

(d) $\left(\frac{3}{2}, \frac{2}{5}\right)$ and $\left(-\frac{7}{11}, \frac{2}{5}\right)$

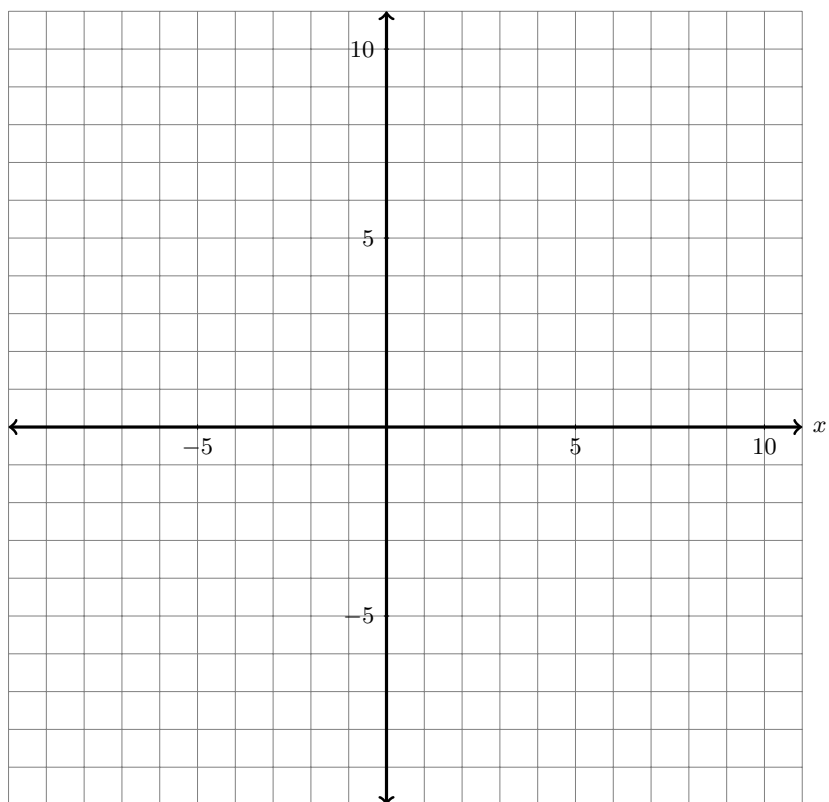
Pr 4. Determine the x - and y -intercept without graphing. Write the coordinates of each intercept. Then use the points to graph each line.

(a) $10x - 12y = 60$

(b) $\frac{3}{4}y = -\frac{1}{2}x + 9$

(c) $x = -7$

(d) $y = 4$



Pr 5. Given the line $x = \frac{5}{6}y - \frac{11}{4}$,

(a) If x increases by 2 units, what is the corresponding change in y ?

(b) If y decreases by 9 units, what is the corresponding change in x ?

(c) If x decreases by 7 units, what is the corresponding change in y ?

Pr 6. If when x increases by 3.3 units, y decreases by 4.5 units, what is the slope of the line containing any point (x, y) ?

SECTION 2.2: MODELING WITH LINEAR FUNCTIONS

- Linear Depreciation, $V(t) = mt + b$
- Cost, variable cost + fixed costs $C(x) = mx + F$
- Revenue, price per item times quantity sold $R(x) = px$
- Profit, revenue minus cost $P(x) = R(x) - C(x)$

Pr 1. A piece of machinery is purchased new for \$350,000 and has a value of \$145,000 after 8 years.
(a) Assuming the value of the machinery depreciates at a constant rate each year, determine the rate of depreciation.

(b) Write the linear depreciation model for the value of the machinery, V , after t years.

(c) What is the value of the machinery after 48 months?

(d) If the machinery reaches scrap value in 10 years, what is the scrap value of the machinery?

Pr 2. An item purchased 5 years ago has a current value of \$4000. After a little research you find the item reaches its scrap value of \$2500 after 108 months. Assuming the item is depreciating linearly, what was the purchase price of the item?

Pr 3. Munckin runs a rainbow lemonade stand that sells glasses of multicolored lemonade. Due to the locate of the stand, the weekly rent for the stand is \$264. The stand makes a profit of \$136 when 50 glasses of lemonade are sold in a week. If only 20 glasses are sold, Munckin knows the total cost for that week is \$344.

(a) Write the cost function for producing x glasses of lemonade at Munckin's stand.

(b) Write the profit function for producing and selling x glasses of lemonade at Munckin's stand.

(c) Write the revenue function for the sale of x glasses of lemonade at Munckin's stand.