

Multiplying Matrices Day 2

Example 1:

A company produces handmade wooden toys. The toys must be cut and assembled. The table below gives the number of labour hours required for each type of toy.

	Cutting	Assembling
Train	0.35	0.15
Boat	0.20	0.10
Plane	0.25	0.50

$[A] =$

(3×2)

The company has an order for 100 trains, 250 boats, and 150 planes.

a) Create a matrix to represent the cutting and assembling times for each type of toy.

See above

$(3 \times 2) (1 \times 3)$
 $A * B$

b) Create a matrix to represent the order of toys.

$$B = \begin{bmatrix} 100 & 250 & 150 \end{bmatrix}$$

$(1 \times 3) (3 \times 2)$

c) Using matrix multiplication, determine the total time required for cutting and the total time required for assembling the order of toys.

$$[B] * [A]$$

$$\begin{bmatrix} 127.5 & 115 \end{bmatrix}$$

Example #2:

The following table shows sales for 3 different "S&E Sound" stores during the month of October.

	Discman	Boom Box	Deluxe Home System
Store A	121	51	15
Store B	103	113	12
Store C	68	45	8

$[A] =$

$[3 \times 3]$

The **discman** sells for \$89.95, the **boombox** for \$121.95, and the **deluxe home system** for \$825.99.

a) Create a matrix to represent the number of each stereo system sold at each store.

See above $(3 \times 3) (3 \times 1)$

b) Create a matrix to represent the price of each item.

$[B] = \begin{matrix} D \\ B \\ PH \end{matrix} \begin{bmatrix} 89.95 \\ 121.95 \\ 825.99 \end{bmatrix} (3 \times 1)$

c) Using matrix multiplication, determine the total revenue from sales for each store in October.

$[A] \times [B]$ $(3 \times 3) (3 \times 1)$ $\begin{matrix} A \\ B \\ C \end{matrix} \begin{bmatrix} 29493.25 \\ 32957.08 \\ 18212.27 \end{bmatrix}$ Sales (3×1)

6. Solve for x in the following matrix.

$$\begin{array}{c} 2 \times \quad 4 \quad \downarrow \\ \rightarrow \begin{bmatrix} 2 & 3 & 5 \\ 4 & 7 & 6 \\ 1 & 2 & 8 \end{bmatrix} \times \begin{bmatrix} 2 & 3 \\ x & 5 \\ 4 & 1 \end{bmatrix} = \begin{bmatrix} 33 & 26 \\ 53 & 53 \\ 40 & 21 \end{bmatrix} \end{array}$$

$$(2 \times 2) + (3x) + (5 \times 4) = 33$$

$$\underline{4} + \underline{3x} + \underline{20} = \underline{33} - 20 - 4$$

$$\begin{array}{r} 3x = 9 \\ \underline{3} \quad \underline{3} \\ x = 3 \end{array}$$

Handout 14-21