

Section 2.3 Math 141

Arithmetic Operations on Matrices

Main ideas

A system of equations can be written using matrices.

Example: $\begin{cases} x + 2y = 5 \\ 3x + 4y = 6 \end{cases}$ can be written as $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 6 \end{bmatrix}$.

To be added or subtracted, matrices must be the same size.

For $m \times n$ matrix A and $p \times q$ matrix B , the product AB exists if $n = p$ (i.e. the width of A and the height of B are equal) and the resulting matrix is $m \times q$.

In Class

1. Let's look at Book Examples 2 and 3 regarding matrix multiplication.
2. Let's look at Book Example 7. In that example, now multiply each side of the equation (on the left) by $\begin{bmatrix} -\frac{7}{2} & 2 \\ \frac{3}{2} & 1 \end{bmatrix}$, and see what happens.

$$\begin{bmatrix} -2 & 4 \\ -3 & 7 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 2 \\ 7 \end{bmatrix}$$

Next time: where did $\begin{bmatrix} -\frac{7}{2} & 2 \\ \frac{3}{2} & 1 \end{bmatrix}$ come from? (It depends on the matrix $\begin{bmatrix} -2 & 4 \\ -3 & 7 \end{bmatrix}$.)

On your own, take a look at Book Examples 1, 4 and 5, which explain why matrix multiplication is what it is (it is not just something mathematicians made up).