

4.1 Matrices

a structure to organize info

Matrix - a rectangular array of #'s enclosed in a single set of brackets

	Before Midterms	Before Finals
Math	2 hrs	3 hrs
Science	1 hrs	2 hrs

$$T = \begin{matrix} & \begin{matrix} \text{mid} & \text{Final} \end{matrix} \\ \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix} & \begin{matrix} \text{math} \\ \text{science} \end{matrix} \end{matrix}$$

2×2
row \nearrow by column \nwarrow
(dimensions)

$$A = \begin{bmatrix} -5 & 1 & 6 \\ 0 & 2 & 7 \end{bmatrix}_{2 \times 3}$$

entry/
element
 \downarrow

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \end{bmatrix}$$

In matrix T , $t_{21} = 1$
 $\underbrace{\hspace{1.5cm}}_{\text{location of entry}}$

ex1 Solve $\begin{bmatrix} -3 & -2x-3 \\ -2 & 3y-12 \end{bmatrix} = \begin{bmatrix} -3 & -15 \\ -2 & -2y+13 \end{bmatrix}$ for x and y

$$-2x-3 = -15$$

$$3y-12 = -2y+13$$

$$\boxed{x=6}$$

$$\boxed{y=5}$$

• Matrix Addition / Subtraction

ex2 Let $A = \begin{bmatrix} 0 & 0 \\ 4 & 1 \\ -3 & -5 \end{bmatrix}$ and $B = \begin{bmatrix} -10 & 5 \\ 0 & 4 \\ -7 & 3 \end{bmatrix}$

Find $A+B$ and $A-B$

$$A+B = \begin{bmatrix} 0 & 0 \\ 4 & 1 \\ -3 & -5 \end{bmatrix} + \begin{bmatrix} -10 & 5 \\ 0 & 4 \\ -7 & 3 \end{bmatrix} = \begin{bmatrix} -10 & 5 \\ 4 & 5 \\ -10 & -2 \end{bmatrix}$$

$$A-B = \begin{bmatrix} 10 & -5 \\ 4 & -3 \\ 4 & -8 \end{bmatrix}$$

Is it possible to find the sum $\begin{bmatrix} -2 & 5 & 6 \\ 1 & -8 & 0 \end{bmatrix} + \begin{bmatrix} 1 & -5 \\ 8 & -6 \\ -3 & 0 \end{bmatrix}$?

NO, the matrices do not have the same dimensions.

ex3 $\begin{bmatrix} -3 & 2 \\ 0 & 5 \\ 9 & -8 \end{bmatrix} - \begin{bmatrix} 0 & -1 \\ 7 & 6 \\ 2 & -4 \end{bmatrix} + \begin{bmatrix} 8 & 10 \\ -1 & -9 \\ 4 & 1 \end{bmatrix} = \begin{bmatrix} 5 & 13 \\ -8 & -10 \\ 11 & -3 \end{bmatrix}$

• Scalar Multiplication

Let $B = \begin{bmatrix} 3 \\ 4 \end{bmatrix}$ $2B = 2 \begin{bmatrix} 3 \\ 4 \end{bmatrix} = \begin{bmatrix} 6 \\ 8 \end{bmatrix}$

ex4 Let $D = \begin{bmatrix} 7 & 2 \\ 3 & 1 \end{bmatrix}$ $E = \begin{bmatrix} 0 & -2 \\ -1 & 4 \end{bmatrix}$ Find $2D - 3E$

HW p 221-222 #13-45 odds

$$\begin{bmatrix} 14 & 10 \\ 9 & -10 \end{bmatrix}$$