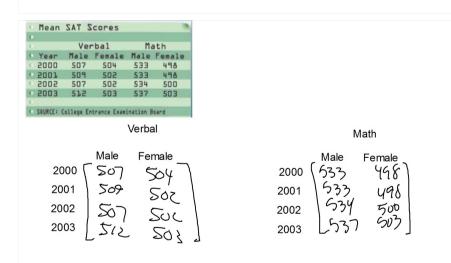
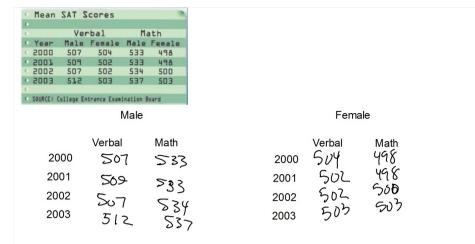


Organize this data using matrices.

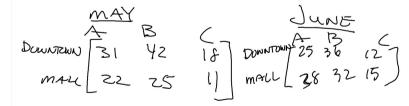




An electronics store has two locations: Downtown & at the mall. Sales for May and June of digital cameras is shown below. Model this data with two matrices.

May Downtown sales: 31 of model A, 42 of model B, 18 of model C
Mall sales: 22 of model A, 25 of model B, 11 of model C

June Downtown sales: 25 of model A, 36 of model B, 12 of model C
Mall sales: 38 of model A, 32 of model B, 15 of model C



Add the two matrices together to create a new matrix.

DOWNTOWN	56	78	<u>5</u> 6/
2021	60	57	26

What are the dimensions of this new matrix?

What do the elements in this new matrix represent?

TOTAL SALES FOR MAYEUUNE

BY MODEL E' LOCATION

On Saturday the store sold the following t-shirts 10 Large Girls, 13 Medium Girls, 8 Small Girls, 15 Large Boys, 7 Medium Boys, and 5 Small Boys.

On Sunday the same store sold the following amounts of the same t-shirt: 5 Large Girls, 19 Medium Girls, 12 Small Girls, 10 Large Boys, 21 Medium Boys, and 4 Small Boys.

Model this data using two matrices.

You can now finish Hwk #21. Sec 4-1

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Problems 20-28

Write a new matrix which is the sum of the two matrices you created on the previous page.

What does this resulting matrix represent?

TOTAL WEEKEND SALES OF T-SHIMS by size and gender

### Matrix Addition:

Two add two matrices they must have the same dimensions.

The resulting matrix has the same dimensions as the two being added.

The elements in the resulting matrix are just the sum of the corresponding elements.

### Definition

#### **Matrix Addition**

To add matrices A and B with the same dimensions, add corresponding elements.

$$A = \begin{bmatrix} a & b & c \\ d & e & f \end{bmatrix} \qquad B = \begin{bmatrix} r & s & t \\ u & v & w \end{bmatrix}$$

$$A + B = \begin{bmatrix} a & b & c \\ d & e & f \end{bmatrix} + \begin{bmatrix} r & s & t \\ u & v & w \end{bmatrix} = \begin{bmatrix} a+r & b+s & c+t \\ d+u & e+v & f+w \end{bmatrix}$$

The additive inverse of any number is its OPPOSITE

Inverse Matrix: The additive inverse matrix of A is -A.

-A is a matrix with the same dimensions as A but whose elements are all the opposites of the corresponding elements in A

$$\begin{bmatrix} 5 & 8 \\ 7 & -6 \end{bmatrix} + \begin{bmatrix} -5 & -8 \\ -7 & 6 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

The Identity Matrix:

What matrix can be added to any matrix to end up with the identical matrix in return?

$$\left[\begin{array}{cc} 5 & 8 \\ 7 & -6 \end{array}\right] + \left[\begin{array}{cc} 0 & 0 \\ 0 & 0 \end{array}\right] = \left[\begin{array}{cc} 5 & 8 \\ 7 & -6 \end{array}\right]$$

The Identity Matrix is called the Zero Matrix 0

#### **Matrix Addition**

If A, B, and C are  $m \times n$  matrices, then

A + B is an  $m \times n$  matrix.

A + B = B + A

(A + B) + C = A + (B + C)

There exists a unique  $m \times n$  matrix O such that O + A = A + O = A.

For each A, there exists a unique opposite, -A. A + (-A) = O

Additive Identity Property

Commutative Property of Addition

Associative Property of Addition

Additive Inverse Property

Closure Property

# **Property**

## **Matrix Subtraction**

If two matrices, A and B, have the same dimensions, then A - B = A + (-B).

# Solve this equation for matrix X.

$$X = \begin{bmatrix} 12 & 5 \\ 57 & -8 \\ -19 & 6 \end{bmatrix} - \begin{bmatrix} 3 & 16 \\ -21 & 40 \\ -23 & 1 \end{bmatrix} \times = \begin{bmatrix} -9 & 11 \\ -78 & 48 \\ -4 & -5 \end{bmatrix}$$

Use these matrices to find each sum and/or difference.

$$A\begin{bmatrix} 2 & -10 \\ -4 & 1 \end{bmatrix} B\begin{bmatrix} -9 & 3 \\ 4 & 20 \end{bmatrix} C\begin{bmatrix} 7 & -13 \\ 8 & 100 \end{bmatrix}$$

1. 
$$A + B = \begin{bmatrix} -7 & -7 \\ 0 & 2 \end{bmatrix}$$
 2.  $C - B = \begin{bmatrix} 16 & -16 \\ 4 & 80 \end{bmatrix}$