

**Motivating Example:**

If a population is declining, is it because the individuals are having trouble surviving or because they are having trouble reproducing or both?

The answer to that question determines which course of action will be most beneficial.

In order to answer the question, we must keep track of what age range (or life stage) individuals belong to, not just how many in total there are.

To do that, we need to use matrix algebra.

**Terminology:**

Matrix (pg. 620) –

Vector (Section 53) –

Row vectors vs. Column vectors –

Elements or entries (pg. 620) –

Size or dimension of a matrix or vector (pg. 620) –

**Laws of Matrix Algebra:**

Equality (pg. 620) –

Zero matrix (pg. 623) –

Addition (pg. 622) –

Subtraction (pg. 622) –

Scalar multiplication (pg. 622) –

Additive inverse (pg. 623) –

Associative property of addition (pg. 623) –

Commutative property of addition (pg. 623) –

Distributive properties of scalar multiplication (pg. 623) –

Matrix multiplication (pg. 624-625) –

Associative property of multiplication (pg. 626) –

Distributive properties of multiplication (pg. 626) –

NOTE: In general, matrix multiplication is NOT commutative!

Special rules for square matrices:

Diagonal matrices (and diagonal entries) (pg. 625) –

Identity matrix (pg. 626) –

Trace –

Determinant –

Multiplicative inverse (pg. 629 – HW #25) –