MATH 2360-012 WEEK 2

SECTIONS 2.1 AND 2.2; PAGES 39–61

Abstract. A matrix is an array of numbers; they were introduced in Chapter 1 as a time-saving notation for writing systems of equations. Now we introduce *matrix arithmetic,* and that allows us to manipulate matrices just like we manipulate vectors. On top of that, we introduce *matrix multiplication.* The upshot of all these efforts is that a system of linear equations can be written as one single equation of matrices.

Section 2.1

Reading. Make sure that you understand:

(1) When two matrices are equal.
(2) Matrix multiplication. (Addition and scalar multiplication for matrices works just vectors, so it should be familiar from Calculus III.)
(3) How to write a whole system of linear equation as *one* equation of matrices.
(4) The entries in a solution column S to a matrix equation $AX = B$ are coefficients in a linear combination of the columns of A that adds up to B. That is, if we denote the columns of A by $\mathbf{a}_1, \ldots, \mathbf{a}_n$ and then entries in S by $s_1, \ldots, s_n$, then one has $s_1\mathbf{a}_1 + \cdots + s_n\mathbf{a}_n = B$. That's what it means to say that S solves $AX = B$.

Suggested problems. To verify that you have understood the material, solve the following problems at the end of the section: 10, 11, 19, 20, 31–34, 41.

Section 2.2

Reading. Make sure that you understand:

(1) Matrix addition and scalar multiplication work together just like for numbers and vectors.
(2) There are different zero matrices.
(3) Matrix multiplication is *not* commutative: one can have $AB \neq BA$, and not just because the products may have different sizes.
(4) The *transpose* of a matrix.

Suggested problems. To verify that you have understood the material, solve the following problems at the end of the section: 6–12, 17, 20, 25, 27, 31.

Date: August 24, 2020.