Reading and Practice

Office Hour Help: M & W 2:30–4:00, Tu 2:00–3:30, & F 1:30–2:30 or by appointment. Website: `http://math.hws.edu/~mitchell/Math204S16/index.php`.

1. Re-read Section 2.2 and Review Section 2.1.

(*a*) Key terms and concepts: $n \times n$ identity matrix, $m \times n$ zero matrix, diagonal entries, $n \times n$ diagonal matrix, matrix multiplication (columns of AB are linear combinations of the columns of A), *matrix multiplication is not commutative*, A^T the transpose of A. Next up: multiplicative inverses of square matrices *sometimes* exist.

2. Read ahead and try: Section 2.2, page 109, Exercises 1, 3 and 5.

3. Section 2.1. Practice. These were all mentioned last time. Not to be handed in, check the answers in the back.

(*a*) Page 100: #5, 7, 8, 9, 10, 31.

(*b*) Try #17. See the discussion after Example 3. First solve $A\mathbf{x} = \begin{bmatrix} -1 \\ 6 \end{bmatrix}$.

(*c*) Try #23. Given $A\mathbf{x} = \mathbf{0}$. Multiply both sides of this equation on the LEFT by C. Now use the other piece of information in the problem.

(*d*) Suppose that A is $m \times n$ and that $CA = I_n$. What size is C? Now suppose that $AD = I_m$. What size is D? Compute CAD two ways: as $(CA)D$ and $C(AD)$. So what can you say about about the matrices C and D? What can you say about their sizes? Now what can you say about the size of A? Now do problem #25.

Collected Work

1. (*a*) Finish WeBWorK LHW6 by Thursday night.

(*b*) Finish Assignment 9 for Friday.

Class Work

1. Calculate these matrix products:

$$AB = \begin{bmatrix} 1 & 1 \\ 2 & 2 \end{bmatrix} \begin{bmatrix} 2 & 6 \\ -2 & -6 \end{bmatrix} = \qquad BA = \begin{bmatrix} 2 & 6 \\ -2 & -6 \end{bmatrix} \begin{bmatrix} 1 & 1 \\ 2 & 2 \end{bmatrix} =$$

$$AC = \begin{bmatrix} 1 & 1 \\ 2 & 2 \end{bmatrix} \begin{bmatrix} 1 & -4 \\ -1 & 4 \end{bmatrix} =$$

2. Assume A is $m \times n$ and B is $n \times p$. Suppose that column 2 of B is 8 times column 1 of B. Prove that column 2 of AB is 8 times column 1 of AB.

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3. Assume A is $m \times n$ and B is $n \times p$. Suppose that the first column AB is all zeroes, but that B has no zero entries. Prove that A has a free variable.

4. Assume A is $m \times n$ and C is $n \times m$. If $CA = I_n$, prove that $A\mathbf{x} = \mathbf{0}$ has only the trivial solution.

5. If A and B are as in Problem 1, evaluate $A^T B^T$ and $B^T A^T$ without and further numerical calculations.