

Honors Math B

Homework 5

A

Read the rest of Apostol, Volume II, Chapter 3 and get started on Chapter 4 for next week.

B

To turn in, do the following problems in Apostol, Volume II: p. 80 exercise 2, p. 85 exercise 1, and p. 94 exercise 3.

To do for yourself, do p. 80 exercises 1 and 6 and p. 95 exercises 7 and 8.

C

1. To turn in: Let $\mathbf{x} \in \mathbf{R}^n$ be a vector considered as an $n \times 1$ matrix A (column vector) and let $\mathbf{y} \in \mathbf{R}^n$ be a vector considered as a $1 \times n$ matrix B (row vector). Then the matrix product AB is an $n \times n$ matrix. If $n > 1$, calculate $\det(AB)$ using only the axioms.

2. To turn in: A matrix is *skew-symmetric* if it is equal to minus its transpose. If $A \in M_{n \times n}$ is skew-symmetric and n is odd, prove that $\det A = 0$.

3. To turn in: Prove that a matrix $A \in M_{n \times n}(\mathbf{R})$ with integer entries has an inverse with integer entries if and only if $\det(A) = \pm 1$. [HINT: Cramer.]