

SM 316 – Spring 2019

Homework 9

Due: Wednesday 17 APRIL 2019

PLEASE READ THE INSTRUCTIONS/SUGGESTIONS ON THE COURSE WEBPAGE.

Hand in the following problems:

1. From the textbook (Schaum's Outline of Beginning Linear Algebra): 3.77 parts a) and c), 3.78 part a), 5.50, 5.68, 10.52, 10.53 parts b) and d)
2. Inverses and the relationship of matrices to real numbers:

(a) Let a , b and c be real numbers. Show that if $a \neq 0$, then

$$ab = ac \text{ implies } b = c.$$

However, if $a = 0$, show that for any $b \neq c$,

$$ab = ac.$$

(b) Let

$$A = \begin{pmatrix} 1 & 2 \\ -1 & -2 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & 2 \\ 0 & -1 \end{pmatrix}, \quad C = \begin{pmatrix} -1 & -2 \\ 1 & 1 \end{pmatrix}.$$

Show that $AB = AC$, but $B \neq C$.

- (c) Find the determinant of A .
- (d) Let D be a matrix with $\det(D) \neq 0$. Then show that

$$DB = DC \text{ implies } B = C.$$

(e) Write a sentence about the connection of the determinant of a matrix and the analogy with the equation of real numbers $ab = ac$.

3. Write a conjecture which states

A square matrix, A , is invertible if...

and list all the different ways you know that a matrix is invertible. Example:

A square matrix, A , is invertible if...

- (a) $\det(A) \neq 0$.
- (b)

I can think of 4 different statement (including determinant).