

SM 316 – Spring 2019

Homework 8

Due: Monday 8 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): 1.72, 1.73, 1.77, 2.80, 2.82
2. Use Gaussian Elimination, showing all row operations, to find the dimension and a basis for the general solution of the linear system

(a)

$$\begin{aligned}x + 2y - 3z &= 0 \\2x + 5y + 2z &= 0 \\3x - y - 4z &= 0\end{aligned}$$

(b)

$$\begin{aligned}x + 2y + 3z + w &= 0 \\2x + 4y + 7z + w &= 0 \\3x + 6y + 10z + 2w &= 0\end{aligned}$$

3. Let

$$A = \begin{pmatrix} 2 & 1 \\ 0 & -1 \end{pmatrix}, \quad B = \begin{pmatrix} 2 & 1 \\ -4 & -2 \end{pmatrix}.$$

- (a) Find the solution to

$$A\vec{x} = \vec{0}, \quad \text{and} \quad B\vec{x} = \vec{0}.$$

- (b) Explain (or show) that $A\vec{x} = \vec{b}$ has a unique solution for any choice of $\vec{b} = (b_1, b_2)^T$.
- (c) Explain (or show) that $B\vec{x} = \vec{b}$ cannot have a unique solution.
- (d) Find a vector $\vec{b} = (b_1, b_2)^T$ such that $B\vec{x} = \vec{b}$ such that there is no solution.