

Homework 4

MATH 231

Will not be collected, but content on Exam 1

***You should feel free to use a calculator or computer if you need to find the reduced row echelon form of matrix.

Reading. Section 1.9 Subsection labelled Existence and Uniqueness Questions (page 77–81). You do not need to worry about the tables on pages 78 and 79.

Exercise 1. Complete the following exercises from Section 1.8 in the course textbook:

#1, 3, 5, 9, 11, 17, 19, 32, 41

Exercise 2. Complete the following exercises from Section 1.9 in the course textbook:

#1, 15, 17, 33, 37, 38

Exercise 3. Suppose $T: \mathbb{R}^2 \rightarrow \mathbb{R}^3$ is a linear transformation such that $T(\mathbf{e}_1) = \begin{bmatrix} 2 \\ 0 \\ 1 \end{bmatrix}$ and

$$T(\mathbf{e}_2) = \begin{bmatrix} -1 \\ -3 \\ 2 \end{bmatrix}.$$

(a) Find a formula for $T(\mathbf{x})$, that is, compute $T\left(\begin{bmatrix} x_1 \\ x_2 \end{bmatrix}\right)$.

(b) Find the standard matrix for T .

Exercise 4. Suppose $T: \mathbb{R}^3 \rightarrow \mathbb{R}^2$ is a linear transformation such that

$$T\left(\begin{bmatrix} 1 \\ -3 \\ 7 \end{bmatrix}\right) = T\left(\begin{bmatrix} 5 \\ 2 \\ 0 \end{bmatrix}\right)$$

Find a nontrivial solution to $T(\mathbf{x}) = \mathbf{0}$.