HOMEWORK 4
MATH 115A-1

The following problems are due on **Thursday, July 26 at the beginning of the lecture**: Section 2.4: 15, 17. Section 2.5: 14. Section 5.1: 8, 11, 17. Section 5.2: 8, 11, 12. Also **Question 1** and **2** below.

Question 1: Consider the vector space $\mathbb{R}^\infty$ of real sequences. The element of $\mathbb{R}^\infty$ look like $(a_n) = (a_1, a_2, a_3, \ldots)$. Let $T : \mathbb{R}^\infty \to \mathbb{R}^\infty$ be a linear transformation defined by

$$T(a_1, a_2, a_3, \ldots) = (0, a_1, a_2, a_3, \ldots)$$

Show that T have no eigenvalues.

Question 2: Find all eigenvalues and eigenvectors of the following matrices. Then determine whether they are diagonalizable or not, and if diagonalizable then find an invertible matrix Q and a diagonal matrix D such that $Q^{-1}AQ = D$.

(1) $\begin{pmatrix} 1 & 4 \\ 3 & 2 \end{pmatrix}$.

(2) $\begin{pmatrix} 3 & 0 & 0 \\ -3 & 4 & 9 \\ 0 & 0 & 3 \end{pmatrix}$.

Additional practice problems: Section 2.4: 1, 2, 15-17, 21, 23. Section 2.5: 1, 2, 6(a)(c), 8, 11. Section 5.1: 1, 3, 4(a)(e)(i)(j), 6, 7, 8, 9, 10, 11, 15, 17. Section 5.2: 1(a)-(g), 2, 8, 11, 12.