Math 3592H **Honors Mathematics I** **Fall Semester 2010**

Assignment 12 – Due **Tuesday** 12/7/2010. There will be no quiz on this day. The third midterm exam is on December 9. You will be tested on the material in Sections 2.1 - 2.6 which we have studied.

Read: Hubbard and Hubbard Section 2.7 and the following parts of Section 2.8: only pages 232-237, the beginning of Example 2.8.6, the beginning of Example 2.8.14 and the beginning of Example 2.8.15. We will not do Kantorovich's theorem in Section 2.8.

Exercises (Due **Tuesday** 12/7/2010):
2.7 (page 231-2): 1*, 2, 3, 5, 6
2.8 (pages 251-253): 2, 4, 6b*, 7a, 10, 12a
2.11 (page 281): 22b, 23
The following exercises are not relevant for the material we do this week. I list them because they may be useful practice for the mid-term exam. 2.11 (pages 278-282); 8, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21

Extra questions:

1. For each of the following matrices, representing a linear map $\mathbb{R}^2 \to \mathbb{R}^2$, either find a basis consisting of eigenvectors or else show that such a basis cannot exist.

$$(a)*\begin{pmatrix} 3 & -1 \\ 2 & 0 \end{pmatrix}; \qquad (b)*\begin{pmatrix} 22 & -9 \\ 49 & -20 \end{pmatrix}; \qquad (c)\begin{pmatrix} 4 & -1 \\ 2 & 1 \end{pmatrix}; \qquad (d)\begin{pmatrix} 13 & -6 \\ 0 & -13 \end{pmatrix}$$

2. (a)* Regarding each of the matrices in question 1 as the matrix of a linear map expressed with respect to the standard basis of $\mathbb{R}^2$, find the matrix of this linear map when expressed with respect to the basis $\binom{1}{2}, \binom{-1}{-1}$.

3.* Find a matrix P so that PAP^{-1} is diagonal, where $A = \begin{pmatrix} 3 & -1 \\ 2 & 0 \end{pmatrix}$.

4. Find a basis for $\mathbb{R}^3$ consisting of eigenvectors of the following matrix, or else show that such a basis does not exist:

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 3 & -1 \\ 0 & 2 & 0 \end{pmatrix}$$