Name _____ Class Time _____

Math 2250 Extra Credit Problems
Chapter 6
S2012

Due date: The due date for these problems is week 13. Records are locked on that date and only corrected, never appended. Credits earned here apply only to chapter 6 and not to any other chapter.

Maple labs 6 and 7 do not have extra credit problems.

Submitted work. Please submit one stapled package per problem. Kindly label problems **Extra Credit**. Label each problem with its corresponding problem number, e.g., Xc6.1-36. You may attach this printed sheet to simplify your work.

Problem Xc6.1-12. (**Eigenpairs of a** 2×2)

Let $A = \begin{pmatrix} 9 & -10 \\ 2 & 0 \end{pmatrix}$. Find the eigenpairs of A. Then report eigenpair packages P and D such that $AP = PD$.

Problem Xc6.1-20. (**Eigenpairs of a** 3×3)

Let $A = \begin{pmatrix} 5 & -6 & 3 \\ 6 & -7 & 3 \\ 6 & -6 & 2 \end{pmatrix}$. Find the eigenpairs of A. Then report eigenpair packages P and D such that $AP = PD$.

Problem Xc6.1-32. (**Complex eigenpairs of a** 2×2)

Let $A = \begin{pmatrix} 0 & -6 \\ 24 & 0 \end{pmatrix}$. Find the eigenpairs of A. Then report eigenpair packages P and D such that $AP = PD$.

Problem Xc6.1-36. (**Eigenvalues of band matrices**)

Find the eigenvalues of the matrix A below without the aid of computers.

$$A = \begin{pmatrix} 1 & 2 & 0 & 0 & 0 & 0 \\ 2 & 1 & 2 & 0 & 0 & 0 \\ 0 & 2 & 1 & 2 & 0 & 0 \\ 0 & 0 & 2 & 1 & 2 & 0 \\ 0 & 0 & 0 & 2 & 1 & 2 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

Problem Xc6.2-6. (**Eigenpair packages of a** 3×3)

Let $A = \begin{pmatrix} 2 & -2 & 1 \\ 2 & -2 & 1 \\ 2 & -2 & 1 \end{pmatrix}$. Find the eigenpairs of A. Then report eigenpair packages P and D such that $AP = PD$. Check the answer by hand, expanding both products AP and PD, finally showing equality.

Problem Xc6.2-18. (**Fourier's model for a** 3×3)

Assume Fourier's model for a certain matrix A:

$$A\left(c_1\begin{pmatrix} 1 \\ 0 \\ -2 \end{pmatrix} + c_2\begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix} + c_3\begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}\right) = 3c_1\begin{pmatrix} 1 \\ 0 \\ -2 \end{pmatrix} + c_2\begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix} + c_3\begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}.$$

Find A explicitly from $AP = PD$. Check your answer by finding the eigenpairs of A.

Problem Xc6.2-28. (**Eigenpairs and diagonalization of a** 4×4)

Determine the eigenpairs of A below. If diagonalizable, then report eigenpair packages P and D such that $AP = PD$.

$$A = \begin{pmatrix} 1 & 2 & 0 & 0 \\ 2 & 1 & 2 & 0 \\ 0 & 2 & 1 & 2 \\ 0 & 0 & 0 & 13 \end{pmatrix}$$

End of extra credit problems chapter 6.