

Math 2270 Extra Credit Problems
Chapter 2
S2010

Due date: See the internet due dates. Records are locked on that date and only corrected, never appended.

Submitted work. Please submit one stapled package. Kindly label problems Extra Credit. Label each problem with its corresponding problem number. You may attach this printed sheet to simplify your work.

Problem XC2.1-16. (Invertible T)

Decide invertibility of $T(\mathbf{x}) = A\mathbf{x}$ for the following matrices A . Then find the matrix of T^{-1} , in each case.

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

Problem XC2.1-43. (Matrix of T)

- (a) Suppose \mathbf{v} has components 2, -2 , 5. Find the matrix of $T(\mathbf{x}) = \mathbf{v} \cdot \mathbf{x}$.
 (b) Prove that every linear transformation T from \mathcal{R}^3 into \mathcal{R}^1 can be written as $T(\mathbf{x}) = \mathbf{v} \cdot \mathbf{x}$ for some vector \mathbf{v} .

Problem XC2.1-46. (Matrix of T)

- (a) Let $T(\mathbf{x}) = B(A(\mathbf{x}))$ where

$$A = \begin{pmatrix} 1 & 2 \\ 3 & 0 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & 1 \\ -1 & 1 \end{pmatrix}.$$

Find the matrix of T .

- (b) What is the matrix of T defined by $T(\mathbf{x}) = B^2(A(\mathbf{x}))$?

Problem XC2.2-18. (Reflection line equation)

Let a reflection T have matrix $\frac{1}{2} \begin{pmatrix} \sqrt{3} & 1 \\ 1 & -\sqrt{3} \end{pmatrix}$. Find the equation for the line L of reflection.

Problem XC2.2-26. (Matrix of T)

- (a) Find the scaling matrix A if $T\left(\begin{pmatrix} 2 \\ -1 \end{pmatrix}\right) = \begin{pmatrix} 8 \\ -4 \end{pmatrix}$.
 (b) Find the projection matrix A if $T\left(\begin{pmatrix} 2 \\ 3 \end{pmatrix}\right) = \begin{pmatrix} 2 \\ 0 \end{pmatrix}$.

Problem XC2.2-39. (Composite linear transformations)

Each of the matrices below is a standard geometric linear transformation followed by a scaling. Find the scale factor.

$$\begin{pmatrix} 2 & 2 \\ 2 & 2 \end{pmatrix}, \quad \begin{pmatrix} 6 & 0 \\ -2 & 6 \end{pmatrix}, \quad \begin{pmatrix} 3/4 & 1 \\ 1 & -3/4 \end{pmatrix}.$$

End of extra credit problems chapter 2.