MATH 307 Section C, Homework No. 10

Reading

Section 5.4, 5.5 and 6.1

Exercises. Problems in bold face will be graded. Homework must be handed in by Tuesday, April 15-th.

Section 5.4: Exercise 7, **8**, 11,13, **14**.

Section 5.5: Exercise 1, 13, **2**, **14**.

Additional problem

Consider the transformation $T : \mathbf{R}^3 \to \mathbf{R}^3$, defined using the matrix

$$A := \begin{pmatrix} 1 & -\frac{1}{8} & 1 \\ 2 & 0 & 0 \\ 1 & 0 & 0 \end{pmatrix},$$

as $T(\vec{x}) = A\vec{x}$.

Consider the basis

$$B = \left(\begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix} \right),$$

and the basis

$$C = \left(\begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix} \right).$$

1. Find the matrix associated with T with respect the basis B, A_{BB}, and the matrix associated with T with respect the basis C, A_{CC}.
2. Find the transition matrix which allows us to transform coordinates with respect to B to coordinates with respect to C, P_{BC}.
3. Verify that $A_{CC} = P_{BC} A_{BB} P_{CB}$
4. What is the matrix associated with T in the standard basis?
5. Is there a basis D such that the associated matrix A_{DD} is diagonal? If No, justify your answer. If yes find such a basis.