MAT211 Review for Midterm 2

Coordinates - Linear spaces - Orthogonality

Example (4.1-25)

Let W be the space of all polynomials f in P_3 such that f(1)=0. Determine whether the following subspace of P_3 and if so, find its dimension.

EXAMPLE (4.2-13)

Let T be a transformation from R^{2x2} to R^{2x2} defined by T(M)=A.M - M.A where A is the matrix

$$\begin{vmatrix} 1 & 2 \\ 0 & 1 \end{vmatrix}$$

Find out whether T is linear. If it is, find kernel, image and nullity and determine whether is an isomorphism.

EXAMPLE (4.2-67)

For which constants k is the linear transformation T(M)=AM-MB an isomorphism if A and B are the matrices

$$\begin{vmatrix} 2 & 3 \\ 0 & 4 \end{vmatrix} \qquad \begin{vmatrix} 3 & 0 \\ 0 & k \end{vmatrix}$$

EXAMPLE (4.3-21)

Find the matrix (with respect to the standard basis) of the transformation T from P_2 to P_2, T(f)=f'-3f.

Determine whether is an isomorphism

Find basis of kernel and image of T.

Determine nullity and rank.

EXAMPLE(5.1-27 modified)

Find the orthogonal projection of $9e_1$ onto the subspace of R^4 spanned by (2,2,10) and (2,2,0,1)

EXAMPLE (5.2-39)

Find an orthonormal basis u_1, u_2, u_3 of R^3 such that

- span(u_1)=span((1,2,3))
- span(u_1,u_2)=span((1,2,3),(1,1,-1))

EXAMPLE (3.4-39)

Denote by T the reflexion abou t the line in R^3 spanned by (1,2,3).

Find a basis of R^3 such that the matrix of T is diagonal.