Problem 37.

Let be a multiplication by A.

Determine whether T has an inverse.

If so, find , where

[1] Compute detA

[2] Compute inverse of A

[3] Compute Cofactor Matrix

Cofactor of

Cofactor of

Cofactor of

Cofactor of

Cofactor of

Cofactor of

Cofactor of

Cofactor of

Cofactor of

[4] Compute Adjugate Matrix

[5] Compute the Inverse of 𝐴

[6] Find

Problem 38.

Let be defined as

[1] Find :

Let

Thus,

[2] Show that is a linear transformation.

A linear transformation (or a linear map)

is a function

that satisfies the following properties:

Additivity

OR

Where & are polynomials

Scalar multiplication

OR

Where is a polynomial &

is a scalar

**Additivity**

Let & be polynomials

And,

Thus,

**Scalar multiplication**

Let & be polynomials, and be a scalar

( )

And,

Thus,

Therefore, both additivity and scalar multiplication hold,

𝑇 is a linear transformation.

[3] Show that is one-to-one

Injective

A transformation is one-to-one if

for every vector b in

the equation has at most one solution in

In the case of a transformation defined by polynomials,

𝑇, is one-to-one if:

implies

Where & are polynomials

Let

Thus, and

Therefore, is one-to-one

Problem 39.

Suppose is a linear operator defined by

Find the matrix for T with respect to the basis where

[1] Compute

As a linear combination

System of equations

Thus , , ,

[2] Compute

As a linear combination

=

System of equations

Thus , , ,

[3] Compute

As a linear combination

System of equations

Thus , , ,

[4] Basis

Problem 40.

Find where

Given

[1] Compute

[2] Compute

Thus,