

Matrix theory Assignment 16

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Abstract—This document contains the concept of algebra of polynomials.

Download all python codes from

https://github.com/shivangi-975/EE5609-Matrix_Theory/tree/master/Assignment16/Codes

Download latex-tikz codes from

https://github.com/shivangi-975/EE5609-Matrix_Theory/blob/master/Assignment16/Assignment_16.tex

f and g are independent polynomial. Also from equation (3.0.2) $a=0$ and $b=0$.

Hence proved fh and gh are independent.

1 PROBLEM

If f and g are independent polynomials over a field \mathbf{F} and h is a non-zero polynomial over \mathbf{F} , show that fh and gh are independent.

2 DEFINITION

Polynomials $(f_1, f_2, \dots, f_m) \in k(x_1, \dots, x_n)$ are called algebraically independent over a field \mathbf{F} , if there is no nonzero m -variate polynomial $A \in k[y_1, \dots, y_m]$ such that $A(f_1, \dots, f_m) = 0$

3 SOLUTION

Given f and g are independent polynomials over a field \mathbf{F} . Consider scalars a and $b \in \mathbf{F}$. Hence,

$$af + bg = 0 \quad (3.0.1)$$

Since f and g are independent Hence f and $g \neq 0$

$$\implies a, b = 0. \quad (3.0.2)$$

Given h a non zero polynomial over \mathbf{F} . Substituting in equation (3.0.1) we have,

$$a(fh) + b(gh) = 0 \quad (3.0.3)$$

$$(af)h + (bg)h = 0 \quad (3.0.4)$$

$$(af + bg)h = 0 \quad (3.0.5)$$

$$af + bg = 0 \quad (3.0.6)$$