14. Interlude: Polynomials and Geometric

Homework0 due Feb 8, 2023 08:59 -03 Completed

Quadratic Polynomials

1/1 point (graded)

Recall a **degree n** polynomial in $x_1, x_2, \ldots, x_k$ is a linear combination of monomials in the highest of degrees of the monomials with non-zero coefficients is n.

(Recall **monomials** in $x_1, x_2, \ldots, x_k$ are **unordered words** using $x_1, x_2, \ldots, x_k$ as th of a monomial is its length (or power), e.g. the monomial $x_1 x_2 x_3^2 := x_1 x_2 x_3 x_3$ has de

Examples:

1. A degree 2, also known as quadratic, polynomial in the 1 variable x is of the form

$$ax^2 + bx + c$$

for some numbers a, b, c. The polynomial is determined by the 3 coefficients $a,$ choices of (a, b, c) result in different polynomials.
In linear algebraic terms, the space of degree 2 polynomials in 1 variable is of di consists of all linear combinations of 3 linearly independent vectors x^2, x, and

2. A degree 2 polynomial in 2 variables x_1, x_2 is of the form

$$ax_1^2 + bx_2^2 + cx_1x_2 + dx_1 + ex_2 + f$$

for some numbers a, b, c, d, e, f. Different choices of (a, b, c, d, e, f) result in d
In linear algebraic terms, the space of degree 2 polynomials in 2 variables is of d consists of all linear combinations of 6 linearly independent vectors x_1^2, x_2^2, x_1

Consider degree 2 polynomials in 3 variables x_1, x_2, x_3. How many coefficients are ne determine such a polynomial? Equivalently, what is the dimension of the space of polyn such polynomials?

Number of coefficients needed/ Dimension: 10 ✔

What is dimension of the polynomials of degree N in K variables? (This part of the qu there is no answer box for it.)

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