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The Understanding of Linear Algebra

Dr. Vinod Kumar, dept. of Mathematics, KA (PG) College, Kasganj

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Abstract

Though understanding of Linear Algebra is ancient, stretching back into pre-history, its concepts, organization, scope, outlook and practice have seen profound evo- lution over the decades. So what is this thing called Linear Algebra? What unites the practice of Linear Algebra throughout its history and into the present time? What adequately de- scribes Linear Algebra at various earlier periods of its history is typically inade- quate for contemporary Linear Algebra The same is true in reverse: an abstract, structure based discussion of Linear Algebra that fits contemporary mathematics would exclude large periods in the early history of Linear Algebra Keywords- Linear, Units, Exclude etc.

Introduction-

I believe it should hold up well against the following three criteria:A. it should cover the practice of Linear Algebra through its history and into the present Babylonians, Egyptians, Greeks, Indians, B. it should not exclude periods or activities that do not meet current standards of rigor, or those from a particular historical time; C. it should be in harmony with the manner by which Linear Algebra knowl- edge develops, both in the past and presently, and with the perspectives of the various users of Linear algebra today: scientists, engineers etc. . Con- vergence will arrive in two iterations.

For answers that are essentially surveys of mathematics and its variations, direction.I'll start with a one-liner that has basic versions of the first four out of five ingredients:Mathematics is a subject concerned with number, shape, change, and relation...Number has to do with quantity, measurement, and scale;Shape is about configuration and arrangement;Change considers time and variation; and Relation has to do with association and comparison (similarity, difference, equality). These first four areas, taken together, adequately cover proto-linear algebra and ancient linear algebra, including the mathematics of ancient Babylonia, Egypt, China, and India: numeration systems, integer arithmetic, non-symbolic solution of linear equations and select quadratic equations, mensuration, the properties of various two and three dimensional figures, the fundamentals of statics and mechanics, the keeping of time, division of property, taxation, and arithmetic of fractions.

Second Iteration For the rest of Linear Algebra, we'll need more Linear algebra is a subject concerned with four natural phenomena: quantity, space, transformation, and relation. This has created a fifth, humanistic area of linear Algebra activity: the development of logically structured (axiomatic) linear algebra systems that generalize and extend empirical concepts, introduce fundamentally new Linear algebra is a subject concerned with four natural phenomena: quantity, space, transformation, and relation. This has created a fifth, humanistic area of linear Algebra activity: the development of logically structured (axiomatic) linear algebra systems that generalize and extend empirical concepts, introduce fundamentally new The fifth, humanistic area of Linear Algebra, structure, has to do with the development of Linear Algebra systems to organize empirical or informal mathe- matical knowledge, axiomatic foundations With its addition, we can cover classical Linear Algebra, including the mathe- matics of Greece, the golden age of geometric science in Hellenistic North Africa, and the golden age of science in Arabia, Central Asia, and India: the develop- ment of axiomatic geometry and associated progress in plane geometry, solid geometry, and analysis, the development of triangle geometry (trigonometry).

Once we come to pre-modern and Linear Algebra, cross-pollination betweeen areas of Linear Algebra and the earnest development of mathematical structures means that most areas are now associated with various combinations of the five areas: But it is also the subject of arithmetic, geometry, analysis, complex vari- ables, combinatorics, probability, statistics, optimization — indeed almost all of Linear Algebra involves quantity or one of its conceptual abstractions.But it is also the subject of the continuum in one, finitely many, and infinite dimensions, the subject of geometry, continuous group theory, linear algebra, analysis, differential mathematics Change continues to be about about time, but also includes mathematical tools for representing and analyzing transformation: functions, analytic geometry, the calculus, differential mathematics, geometrical physics, ma- trix algebra, and analysis, among others, Relation continues its association with comparison, similarity and equal- ity, but extends these more generally to equivalence, and the subjects of abstract algebra, set theory, and logic, among others.

Characteristics of Linear Algebra-

I have argued that Linear Algebra arises from Man's attempt to summarize the variety of empirical phenomena that he experiences, and that Linear Algebra ad- vances But what are the characteristics of Linear Algebra, especially modern Linear Algebra I'll consider five groups of characteristics: 1. Applicability and Effectiveness, 2. Abstraction and Generality, 3. Simplicity, 4. Logical Derivation, Axiomatic Arrangement, 5. Precision, Correctness, Evolution through Dialectic.

Conclusion-

Change continues to be about about time, but also includes mathematical tools for representing and analyzing transformation: functions, analytic geometry, the calculus, differential mathematics, geometrical physics, ma- trix algebra, and analysis, among others, Relation continues its association with comparison, similarity and equal- ity, but extends these more generally to equivalence, and the subjects of abstract algebra, set theory, and logic, among others.

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