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Essay on Mathematics 5
Algebra in Administration

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Introduction

The purpose of this essay is to present algebra as a mathematical tool, its characteristics, classification and usage in administration.

Our essay on algebra will explain its origin since ancient Egyptians, passing through the Greeks, until modern times.

Next, we will describe the diverse manifestation of algebra, from elementary algebra, through linear algebra, as a manifestation of the study of specific properties of linear equations, vector spaces, and matrices.

Boolean algebra, computer algebra, matrix algebra, homological algebra, universal algebra, combinatorial algebra, and algebraic geometry shall be mentioned in our essay.

The relationship between the current world dominated by information technology and the huge amount of information we have to deal with, will be linked to the usage of algebra.

The formalism and abstraction of the algebra shall be stressed in order to view its importance in the context of modern society and labor.

As the culmination of our essay we will present how algebra has shocked favorably the world of business and administration.

At the end of the essay we will present our conclusions and recommendations on regards of the use and application of algebra in our modern world.

Description

Boolean Algebra

Due to the current and future importance of information and communications technology, we are going to analyze the impact of Boolean Algebra on the development of mathematics in general and cybernetics.

Boolean algebra, also known as Boolean algebra, is an algebraic structure that outlines logical operations in mathematics, digital electronics, and computer science.

The creator of the logical system, which was later recognized as Boolean algebra, was the English self-taught mathematician George Boole (1815-1864), who in his book "Mathematical Analysis of Logic", published in 1847, explained how to use algebraic techniques to analyze expressions of propositional logic. Later, in the year 1854, he published a more complete book on the subject called "An Investigation of the Laws of Thought" or simply "The Laws of Thought"), published in the year 1854.

Boolean algebra found great application in electronic design. Later, in 1948, the American mathematician, electrical engineer and cryptographer Claude Elwood Shannon (1916-2001) applied Boolean algebra in the design of bistable electrical switching circuits. This is why Shannon is known as the father of information theory or computer science. Shannon's logic is applied in two important aspects, analysis, by describing the operation of circuits, and design, since it allows the implementation of a given function to be developed.

General Analysis

The origin of algebra dates to the years of 2000 to 500 BC, time when the Egyptians developed a very elementary algebra that they used to solve everyday problems related to the distribution of food, crops and farming tools.

Later, Heron of Alexandria (20-32 A.D.), a Greek mathematician and scientist, perfected the system for measuring land and approximating the square and cube roots of numbers that do not give exact values.

Nicomanus of Gerasa (60-120 A.D.) published his book "Introduction to Arithmetic", where he pioneered the separation of arithmetic from geometry. His book was a teaching text for most of the Middle Ages.

The Greeks mathematicians had another exponent in Diophantus of Alexandria (325-409 A.D.), who published his book ''Arithmetic'', wherein said text the first- and second-degree equations were rigorously treated.

The knowledge and development of algebra and the research and writings about numbers, calculation methods and algebraic procedures to solve equations and systems of equations was the work of the Arab mathematician and astronomer Al-Jwarizmi (780-835 AD) .

For his part, the Persian mathematician, poet and astronomer Omar Khayyam (1050-1122) demonstrated how to express the roots of cubic equations using the segments obtained by intersecting conic sections.

In Italy, the Italian mathematician Leonardo de Pisa (1170-1250), better known as Fibonacci, published his work "Liber Abaci or Treaty of the Abaco", a text that in the following three centuries was the source of study for all academics interested in arithmetic and algebra.

The introduction in Western Europe of the use of negative numbers, in addition to an exponential notation very similar to the one we use today, in which positive or negative exponents are used indistinctly, was the work of the French mathematician Nicolás Chuquet (1450-1500).

The symbols "+" and "-" were invented in turn by the German mathematician Johan Widmann d'Eger (1460-1498) in the year 1489.

The French mathematician Francois Viète (1540-1603) developed in 1591 the symbolic notation of algebra and represented the unknown constants with literals.

The eminent French mathematician René Descartes (1596-1650) fused geometry and algebra by inventing "analytic geometry". The Cartesian coordinate system was named after him. He is credited as the father of analytic geometry, allowing geometric shapes to be expressed through algebraic equations. He also introduced the exponential notation that we use today.

Cramer's rule is a theorem in linear algebra, which gives the solution of a linear system of equations in terms of determinants. It receives this name in honor of Gabriel Cramer (1704-1752).

Carl Friedrich Gauss (1777-1855), called "The Prince of Mathematics" and the greatest mathematician since ancient times, published the proof that every polynomial equation has at least one root in the complex plane. (Fundamental Theorem of Algebra).

English mathematician George Boole (1815-1864) reduced logic to simple algebra. He also worked on differential equations, finite difference calculus, and general methods in probability. Boolean algebra has wide application in the telephone switch and in modern computer design. Boole's work has come to be a pivotal step in today's computer revolution.

Actualization

Now we will proceed to analyze the different manifestations of algebra in the development of mathematics.

Elementary algebra is the part of algebra taught in early algebra courses. To study algebraic structures such as groups, rings, and fields, abstract algebra is used. The study of specific properties of linear equations, vector spaces, and matrices are studied through linear algebra.

In mathematical problems involving truth values, such as true and false, Bool algebra is used. Commutative rings are studied from commutative algebra. Computer algebra implements algebraic methods, such as algorithms and computer programs. Matrix algebra relates to solutions where we must solve a large system of equations with many unknown.

The study of fundamental algebraic structures for the study of topological spaces is analyzed from homological algebra. When referring to all algebraic structures, we are referring to universal algebra. The study of numbers develops from the theory of algebraic numbers.

The branch of geometry in which curves and surfaces are studied as solutions of polynomial equations is called algebraic geometry. Combinatorial topics in turn are analyzed from combinatorial algebra. And finally, relational algebra studies the set of finite relations that are closed under certain operators.

Discussion

As we know, the so-called "fourth wave" of social and economic processes is the "wave of knowledge", whose greatest exposure has been achieved with information technology, which is characterized by the generation of large amounts of data.

This is a challenge, because the ability to manage large amounts of data is critical for both work and social performance. Since algebra is the science of variables and models, its knowledge is essential to deal with aspects of employability and responsibility and citizenship rights.

The ability to conceptualize ideas from the particular to the general is achieved through the study of algebra. But algebra creates a thought towards the solution of a problem-situation, to be able to differentiate known and unknown quantities and the relationship between them and, very especially, to develop abilities to determine the values of unknown quantities.

Algebra is characterized by its ability to organize quantitative relationships that can reveal new solutions. Using algebra as a basis, similarities in structure can be established between various contexts.

The language used in algebra allows one to think and communicate to other people the general characteristics and structures of situations related to uncertainty, change, quantities, sizes and spaces.

Algebra is characterized by formalism and abstraction. It helps us to understand the current world and to be able to function in that world, both as a worker and as a citizen. Current jobs and social interaction increasingly require the capacity for formalism and abstraction, in order to formulate questions and solve problems.

A large portion of our current society, our technology and our work depend in one way or another on mathematical models. Algebra is the tool to understand those mathematical models. Our ability to use algebra to build these models is essential for success in today's world.

Finally, algebra is the mathematical tool used to represent the relationships of one set of variables to another set. All this process entails and involves symbols, charts, graphs and symbols. That is why algebra is considered the language of mathematics, science, and business.

General Recommendations

Linear algebra is a branch of mathematics which is very useful in business and administration.

On many occasions we carry out certain procedures without realizing the mathematical and algebraic part that is in the background. For example, going to the supermarket for purchases and knowing the price of the things we buy, or using a computer or a cell phone.

These are mostly made up of applications that we use daily such as the browser, WhatsApp, Facebook, Word, etc. ., which are applications built from algebraic programming algorithms which are designed to fulfill your task or go to the bank to make a transfer or a transaction.

These operations to be safe use data encryption by means of linear equations to be able to store our passwords and our data safely. In general, there are many applications of linear algebra that we do not see but that are used daily in our lives.

Linear algebra in business administration is a very important tool since through this it is possible to calculate, for example, the income of a company in different periods of time, the balances, expenses which allow understanding and analyzing the financial statements of a company and thus be able to make a decision on time.

This also allows us to calculate budget statements, and linear algebra in general, provides techniques, tools and methods to better manage information in a more efficient and optimal way under quality standards.

Conclusion

Based on what has been established in this essay regarding algebra, we can conclude the following:

1. Algebra gave a fresh and transcendental projection to various applications of classical mathematics;
2. Algebra was developed by several generations of scientists, but there is a consensus to recognize Rene Descartes as the father of algebra, due to the great contributions and contributions made to its development.
3. Our essay describes the diverse manifestation of algebra, from elementary algebra, through linear algebra, as a manifestation of the study of specific properties of linear equations, vector spaces, and matrices.
4. We point out also the relationship between the current world dominated by information technology and the huge amount of information we must deal with, will be linked to the usage of algebra;
5. As the culmination of our essay we presented how algebra has shocked favorably the world of business and administration.
6. Finally, during our doctoral research project, which will concern the interconnection by means of HVDC/HVAC submarine cable of the electrical markets of the Caribbean region, we will make appropriate use of algebraic algorithms in the calculations and engineering designs inherent to the complexity of these interconnections.

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