MATHEMATICS - "THE QUEEN OF COMMERCE"

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As in most areas of study, the explosion of knowledge in the scientific age has led to specialization in mathematics. One major distinction is between pure mathematics and applied mathematics (e.g. business mathematics): most mathematicians focus their research solely on one of these areas, and sometimes the choice is made as early as their undergraduate studies. Several areas of applied mathematics have merged with related traditions outside mathematics and become disciplines in their own right, including statistics, operations research, and computer science. Business mathematics continues to grow in importance within mathematics, and computation and simulation are playing an increasing role in both the commerce and mathematics, weakening the objection that mathematics does not use the scientific method. In his 2002 book 'A New Kind of Science; Stephen Wolfram argues that computational mathematics deserves to be explored empirically as a scientific field in its own right.

Many mathematicians feel that to call their area commerce is to downplay the importance of its aesthetic side; others feel that to ignore its connection to the commerce is to turn a blind eye to the fact that the interface between mathematics and its applications in commerce and management has driven much development in mathematics. One way this difference of viewpoint plays out is in the philosophical debate as to whether mathematics is created (as in art) or discovered (as in science). It is common to see universities divided into sections that include a division of Commerce and Mathematics, indicating that the fields are seen as being allied but that they do not coincide. In practice, mathematicians are typically grouped with economists at the gross level but separated at finer levels. This is one of many issues considered in the philosophy of mathematics. (See Fig.-1)From the beginning of recorded history, the major disciplines within mathematics arose out of the need to do calculations relating to taxation and commerce, to understand the relationships among numbers, to measure land, and to predict astronomical events. These needs can be roughly related to the broad subdivision of mathematics into the studies of quantity, structure, space, and change. Mathematics typically used in commerce includes elementary arithmetic, such as fractions, decimals, and percentages, elementary algebra, statistics and probability. Business management can be made more effective in some cases by use of more advanced mathematics such as calculus, Probability theory, matrix algebra and linear programming :- 1. Accounting Perspectives 2. Statistics 3. Linear Programming 4. Matrix

1. Accounting Perspective-Each country has its own rules about accounting. It is intentional that financial accounting uses standards that allow the public to compare firms' performance, cost accounting functions internally to an organization and potentially with much greater flexibility. A discussion of inventory from standard and Theory of Constraints-based (throughput) cost accounting perspective follows some examples and a discussion of inventory from a financial accounting perspective. Application of Math in the field of Accounting is –

Inventory Valuation	Standard cost Accounting
Management	Income Tax Law and
Accounting	Accounts
Corporate Accounts	National Accounts

2. Statistics (Probability)-An important field in Business mathematics is statistics, which uses probability theory as a tool and allows the description, analysis, and prediction of phenomena where chance plays a role. Most experiments, surveys and observational studies require the informed use of statistics. As a mathematical foundation for statistics, probability theory is essential to many human activities that involve quantitative analysis of large sets of data. Methods of probability theory also apply to description of complex systems given only partial knowledge of their state, as in statistical mechanics. Most introductions to probability theory treat Discrete probability distributions (deals with events that occur in countable sample spaces, i.e. throwing dice, experiments with decks of cards, and random walk.) and Continuous probability distributions (deals with events that occur in a continuous sample space) separately. The more mathematically advanced measure theory based treatment of probability covers both the discrete, the

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continuous, any mix of these two and more.

3. Linear programming-Linear programming can be applied to various fields of study. Most extensively it is used in business and economic situations, but can also be utilized for some accounting problems. Some industries that use linear programming models include transportation, energy, telecommunications, and manufacturing. It has proved useful in modelling diverse types of problems in planning, routing, scheduling, assignment, and design. Linear programming is heavily used in commerce, microeconomics and company management. Although the modern management issues are ever-changing, most companies would like to maximize profits or minimize costs with limited resources. Therefore, many of issues can boil down to linear programming problems.

In mathematics, **linear programming** (LP) is a technique for optimization of a linear objective function, subject to linear equality and linear inequality constraints. Informally, linear programming determines the way to achieve the best outcome (such as maximum profit or lowest cost) in a given mathematical model and given some list of requirements represented as linear equations. Standard form is the usual and most intuitive form of describing a linear programming problem. It consists of the following three parts:

· A **linear function to be maximized**

e.g. maximize $c_1x_1 + c_2x_2$

· **Problem constraints** of the following form

e.g. $a_{11}x_1 + a_{12}x_2 \leq b_1$

$a_{21}x_1 + a_{22}x_2 \leq b_2$

$a_{31}x_1 + a_{32}x_2 \leq b_3$

· **Non-negative variables** : e.g. $x_1 \geq 0$,$x_2 \geq 0$

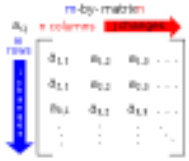
The problem is usually expressed in matrix form, and then becomes:

Maximize $\mathbf{c^T x}$

Subject to $\mathbf{Ax \leq b,\ x \geq 0}$

Other forms, such as minimization problems, problems with constraints on alternative forms, as well as problems involving negative variables can always be rewritten into an equivalent problem in standard form.

4. Matrix-In mathematics, a **matrix** (plural **matrices**) is a rectangular table of elements (or entries), which may be numbers or, more generally, any abstract quantities that can be added and multiplied. Matrices are used to describe linear equations, keep track of the coefficients of linear transformations and to record data that depend on multiple parameters. Matrices are described by the field of matrix theory. They can be added, multiplied, and decomposed in various ways, which also makes them a key concept in the field of Commerce.



5. Calculus-Understanding and describing change is a common theme in commerce and calculus was developed as a powerful tool to investigate it. Functions arise here, as a central concept describing a changing quantity. Many problems lead naturally to relationships between a quantity and its rate of change, and these are studied as differential equations. (See Fig-2)

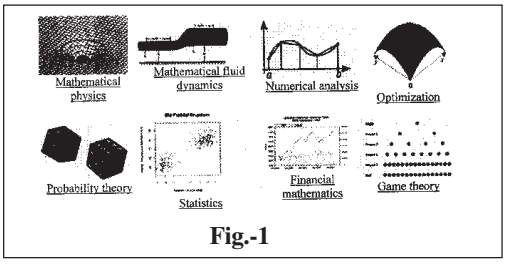


Fig.-1

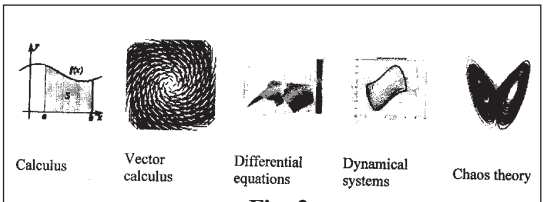


Fig.-2

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