Numerical Methods, Mathematics in Daily Life and Study of Indian Mathematician

Tejaswini Smita Sanjay Sawant[1], Sujata Milind Gupte [2], Rizvi Syed Ismat Fatima[3]

[1]Tejaswini Smita Sanjay Sawant, VPM's Polytechnic Thane, Maharashtra, India
[2]Sujata Milind Gupte, VPM's Polytechnic Thane, Maharashtra, India
[3]Rizvi Syed Ismat Fatima, VPM's Polytechnic Thane, Maharashtra, India

---***---

Abstract - In this journal we study numerical methods and the uses of mathematics in our daily life. Most of the time students are considering the mathematics is not important in current or future life. Mathematics is not only use in daily life but also essential part of our lives. The different methods of finding approximately numerical solutions through the computation are called numerical methods. According to some people, Mathamatics is just the use of complicated formulas, derivations, Calculations which won't be ever applied in real life. But, Mathamatics is the universal language which is applied in almost every aspect of life. Basic mathematical concepts are followed in every day our life. You would be amazed to see the emerging of maths from unexpected situations.

Key Words: Numerical methods, Mathematics, Universal language, Daily life.

1. INTRODUCTION

Maths is everywhere. Maths is fun. Numerical methods is the study of algorithms that use numerical approximation. Numerical methods finds application in all fields of engineering and the physical sciences, but now a days the life sciences, social sciences, medicine, business and even the arts have adopted elements of scientific computations. The growth in computing power has restructure the use of realistic mathematical models in science and engineering, and numerical methods is required to implement these detailed models of the world. Math is very useful in everyday life. Math can help us in many things that are important in our everyday lives. Mathematics is not only use for solving the numerical and derivation but it is also used in our daily lives.

1.1 Numerical methods

Numerical methods are applicable in obtaining solutions of certain types of problems, which do not admit an analytical solution. An approximate solution will serve such purpose. This methods are useful tools for scientific in their field of research, techniques for engineers in their field of technology and process for managers in their field of decision making.

- NUMERICAL INTEGRATION:

The computation of definite integral from the set of numerical values of the integrand is called numerical integration.

The three formulae for numerical integration are
(1) Trapezoidal rule:
    The interval [a,b] is divided into n(even or odd)number of sub-intervals of equal width, then

$$\int_a^b f(x)dx = \frac{h}{2}[(y_0 + y_n) + 2(y_1 + y_2 + y_3 + \cdots \ldots .. + y_{n-1})]$$

$$\int_a^b f(x)dx = \frac{h}{2}[(y_0 + y_n) + 2(y_1 + y_2 + y_3 + \cdots \ldots .. + y_{n-1})]$$

Where $h = \frac{b-a}{n} h = \frac{b-a}{n}$

(2) Simpson's(1/3rd) rule:

    The interval[a,b] is divided into n even number of sub-intervals of equal width, then

$$\int_a^b f(x)dx = \frac{h}{3}[(y_0 + y_n) + 4(y_1 + y_3 + y_{n-1}) + 2(y_2 + y_4 + y_{n-2})]$$

$$\int_a^b f(x)dx = \frac{h}{3}[(y_0 + y_n) + 2(y_1 + y_3 + y_5 + \cdots \ldots .. + y_{n-1}) + 2(y_2 + y_4 + \ldots \ldots \ldots \ldots + y_{n-2})]$$

$$\int_a^b f(x)dx = \frac{h}{3}[(y_0 + y_n) + 2(y_1 + y_3 + y_5 + \cdots \ldots .. + y_{n-1}) + 2(y_2 + y_4 + \ldots \ldots \ldots \ldots + y_{n-2})]$$

Where $h = \frac{b-a}{n} h = \frac{b-a}{n}$

(3)Simpson's(3/8th) rule:

    The interval [a.b]is divided into n number of equally spaced sub-intervals, where n is a multiple of 3, then

$$\int_a^b f(x)dx = \frac{3h}{8}[(y_0 + y_n) + 3(y_1 + y_2 + y_4 + \cdots \cdots + y_{n-1}) + 2(y_3 + y_6 + \cdots \cdots \cdots + y_{n-3})]$$

$$\int_a^b f(x)dx = \frac{3h}{8}[(y_0 + y_n) + 3(y_1 + y_2 + y_4 + \cdots \cdots + y_{n-1}) + 2(y_3 + y_6 + \cdots \cdots \cdots + y_{n-3})]$$

Where $h = \frac{b-a}{n} h = \frac{b-a}{n}$

- FINITE DIFFERENCES:

When a set of two values, say x and y, are given, then in the process of decision making, it is always required to find a relation f between x and y, such that y=f(x).Using number of finite differences between the successive values of y, corresponding to equidistant values of x.it is possible to compute approximate relation between x and y. lt is called the method of finite differences.

- INTERPOLATION

The method of estimating the value of f(x) for the value of x between the range of given values of x is called interpolation.

Gaussian elimination, the QR factorization method for solving systems of linear equations, and the simplex method of linear programming these methods would give the precise answer if they were performed in infinite precision arithmetic.

Newton's method, the bisection method, and Jacobi iteration using infinite precision arithmetic these methods would not reach the solution within a finite number of steps

2. Mathamatics in Daily life

- **Management of money –**

Money is a source that everyone wants to earn. When you have money, you decide how much you can save and how much you will spend on your needs and wants. It's also important to think about the differences between needs and wants as you decide how you spend your money. For example, people need dresses to wear and food to eat, but people don't need luxury gadgets and games. A budget is a best idea or logical thinking for managing your money. Most of the time, it's best not to spend all of your money unnecessary, especially if you're buying things you don't need. Saving money helps you plan for special purchases or activities you want to do in the future. Maths is used to

decide the budget and to decide further goals to achieve we are using simple mathematical concepts only. Here we are using Addition, subtraction, multiplication, division, percentage, Arithmetic calculations.

- **Management of bank work –**

When we want to use a checkbook, we need to know basic addition and subtraction to keep our money balanced. If we are balancing a checkbook means we have record of all additions (deposits) made to our account and subtractions (withdrawals). Each deposit and withdrawal is called a transaction. The motive behind for maintaining the balance in a checkbook is to know how much actual money you have deposit or debit in your checking account at any given time.

Home decor, interior and remodeling-

Calculating areas is an important skill. It will be useful for your teen in remodeling future homes and apartments. Interior designers and decorators have used their skills are as a "Divine Proportion" and they convert it mathematically into the 60-30-10 color rule. They use when decorating a home with color. When they suppose make use of 60 percent of the room a golden bright color; allow 30 percent for a dark brown or gray contrast color and 10 percent for a purple color accent, the complementary color to yellow. If they stick to the 60-30-10 color rule when combining colors in a room, as long as they choose colors of the same value and intensity, the color composition creates an eye-pleasing palette. The same aspect applies to the number of objects used in a decorating scheme or when putting flowers into a vase; the use of odd numbers creates the best effects. Starfish, a pentagon and the pattern you see when you cut an apple in half all contain five arms, sides or elements. One of the concept of five-pointed designs ,if they used in their design it provide a pleasing balance, which is why three, five or seven flowers in a vase look better than an arrangement created with an equal number of flowers.

- **Construction purpose**

A lot of calculations, preparations of budgets, setting targets, estimating the cost all done based on maths. Preparing budgets Taking measurements, Estimating the cost and profit Arithmetic calculations, Geometry, Calculus and Statistics, Trigonometry these all methods used in construction field

- **Sports-**

Geometrical thinking and best use of geometry can help anyone who want to improve their skill in sports. This type of thinking and mathematical evaluation can help them find the best way to hit a ball, make a basket or run around the track. Basic knowledge of math also helps keep track of sports scores. Maths improves the cogitative and decision making skills of person, such skills are important for a sport person to take right decision. Probability, logical reasoning, game theory are useful here.

- **Cooking and Baking**

People use math knowledge when cooking. For example, it is very common to use a half or double of a recipe. So now here, people use proportions and ratios to make correct calculations for each ingredient. If a recipe calls for 1/3 of a cup of flour, the cook has to calculate how much is half or double of 1/3 of a cup. Then the cook has to represent the amount using standard measures used in baking, such as ¼ cup, 1/3 cup, ½ cup or 1 cup. Quantity to used, proportion of the ingredients, cookware to use. We are using Mathematical Algorithm, Mathematical operation, proportion.

- **Shopping at grocery stores/supermarkets**

Math is useful in finding the best deal for food items. Here we are observing some concessional values, schemes, quantity, quality and finally the total price of the product. We are using Algebra, Basic operations.

- **Exercise, Health, and Fitness**

There are also mathematical operator through that anyone can use to calculate your body fat percentage on any given day. We set our routine according to our workout schedule, Count the number of repetition while exercising. Here we use logical and analogical reasoning.

- **Fashion Designing**

Maths is an essential concept in this field. Estimating the quality and quantity of the cloths, measurements, estimating the cost and profit as per the needs of the

customers. We are using Basic operations like Geometry, ratios and percentage here.

- **Management of time**

An individual wants to complete several assignments in a stipulated time. Logical reasoning, basic mathematical operations are useful here.

- **Driving:-**

Speed, Time and Distance are studied in mathematical subjects. Logical reasoning, Numerical reasoning are used here.

- **Auto-mobile Industry:-**

Manufacturing depends on the demand of the customers. Statistics and Ratios, proportion are use to deal with customer's satisfaction.

- **Computer Applications :-**

Study of this is impossible without maths. Concepts of Algorithm, Computations, Power point, excel are impossible to learn without Maths. Coding methods, Algorithm, Cryptography Computations are used in this field.

- **Planning a Trip :-**

For long vacations, we are planning budget, number of days, destinations, hotels, adjustments of the other work, here comes the role of maths. We are using budgeting, Algebra, calculations.

- **Hospitals :-**

To decide schedule and timings of doctors, way of conducting any surgery, keeping records of patients, success rate of surgery, number of ambulance required, Training for use of medicines to nurses. Budgeting, Body mass Index, Operations, Ratios and Proportions. Now days in this pandemic Mathematical modelling is useful.

- **Video Games:-**

To win the games the Mathematical techniques are used. Not only playing but when new games are introduced on the basis of mathematical

representation only, here we use game theory, probability, computation, geometry, logic, calculus, algebra, statistics.

- **Weather Forecasting :-**

Weather forecasting fully based on probability concepts. Probability and statistics are used here.

- **Music and Dance :-**

To learn singing or different steps of dance we are using mathematical steps. Musical pieces are read much like you would read math symbols. The musical notations represent some sort of information about the piece. Musical symbols are divided into sections called measures or bars. Each measure embodies an equal amount of time. Furthermore, each measure is divided into equal section of musical section called beats. These are all mathematical divisions of time.

- **Planning of Cities-**

Planning includes concept of budgeting, setting targets and many more. Trigonometry, algebra, linear programming, operation research are used here.

3. D. R.Kaprekar

Dattaraya Ramchandra Kaprekar was born on 17 January 1905 Dahanu, Maharashtra and died in 1986 Devlali, Maharashtra. Occupation of Kaprekar was as school teacher known for results in re-creational mathematics. D.R.Kaprekar was an Indian re-creational mathematician, who described several classes of natural numbers including the Kaprekar, harshad and self-numbers and discovered the kaprekar constant named after him. Despite having no formal post graduate training and working as a school teacher, he published extensively and become well known recreational mathematics. Kaprekar received his secondary school education in Thane and studied at Fergusson college in Pune. In 1927 he won the Wrangler R.P. Paranjpe Mathematical Prize for an original Piece of work in Mathematics. He received his bachelor degree in 1929. From 1930-1962 he was school teacher at Nashik in Maharashtra. He published topics as recurring decimals, magic squares and

integers with special properties. He is also known as Ganitanand.

Discoveries:-Kaprekar discovered a number of results in number theory and described various properties of numbers.' Kaprekar constant' which is named after him. He also described self-numbers or Devlali numbers, the Harshad numbers and Demlo numbers. He also constructed certain types of magic squares related to Copernicus magic square. Initially his ideas were not taken seriously by Indian mathematicians, and his results were published largely in low-level mathematics journals or privately published, but international fame arrived when Martin Gardner wrote about Kaprekar in his March 1975 column of Mathematical Games for Scientific American. Today his name is well-known and many other mathematicians have pursued the study of the properties he discovered.

Kaprekar constant :-

In 1949, Kaprekar discovered an interesting property of the number 6174, which was subsequently named the Kaprekar constant. He showed that 6174 is reached in the limit as one repeatedly subtracts the highest and the lowest numbers that can be constructed from a set of 4 digit that are not all identical.

Thus, starting with 1234, we have:

4321-1234 =3087, then

8730-0378 =8352, and
8532-2358 =6174
7641-1467=6174
In general, when the operation converges it does so in at most 7 iterations.
A similar constant for 3 digit is 495.
987-789 =198
981-189 =792
972-279 =693
963-369 = 594
954-459 = 495
Kaprekar number:-
It is a positive integers with the property that if it is squared, then its representation can be partitioned into

two positive integer parts whose sum is original number.

Eg: 45

$45^2 = 2025 \rightarrow 20+25 = 45$

$9^2 = 81 \rightarrow 8+1 = 9$

$55^2 = 3025 \rightarrow 30+25=55$

Eg : 99, 999

$703^2 = 494209 \rightarrow 494+209 = 703$

Devlali or Self number :-

In 1963, Kaprekar defined the property of Self numbers.

Eg: It cannot be generated from any other integer.

Harshad number:-

They are divisible by the sum of their digits.

Thus, 12 which is divisible by 1+2= 3.

Later on, it is called as Niven numbers.

Demlo number:-

These are numbers- 1, 121, 12321 ….which are the squares of rep-unit 1, 11, 111, 1111….

3. CONCLUSION

According to some people, maths is just the use of complicated formulas and calculation which won't be ever applied in real life. But 'Maths' is the universal language which is applied everywhere. Maths is essential part of your life. Without maths a great many technology, innovations and inventions would never have been born. Maths teaches you to be more patience and rigorous.

REFERENCES

[1]   S.S.Sastry, Numerical methods by..2013

[2]   J.N.Reddy, Numerical methods …2010

[3]   S.S.Sastry, Statistical methods..2012

[4]   https://www.google.com/url?sa=t&source=web&rct=j&url=https://en.m.wikipedia.org/wiki/D._R._Kaprekar&ved=2ahUKEwjN6aHT-_boAhVr4zgGHe0tB30QFjACegQIDxAL&usg=AOvVaw2XmEE51-rDKnP6984m5dEv

[5]   https://www.google.com/url?sa=t&source=web&rct=j&url=https://www.niu.edu/mathmatters/everyday-life/index.shtml&ved=2ahUKEwijntCX_fboAhXvwzgGHaL5BE4QFjAHegQIEBAI&usg=AOvVaw1zAcWzhs1bIk1e5fg1ErCc

BIOGRAPHIES

Miss.Tejaswini S.S.Sawant.
B.E(Mechanical Engineering)
Lecture, VPM's Polytechnic, Thane

Mrs.Sujata M.Gupte
M.sc (maths)
1st year incharge,
VPM's Polytechnic, Thane

Rizvi Syed Ismat Fatima
M.sc (maths)
Lecture,VPM's Polytechnic, Thane