Introduction to Euler′s number and its unique characteristics

1. INTRODUCTION

Euler′s number e is a mathematical constant which is the base of the natural logarithm. It's a unique number whose natural logarithm is equal to one. It's value is approximately 2.71828 and is the limit of (1 + 1/n)n as n approaches infinity. It can also be calculated as the sum of the infinite series:

$$e = \sum_{n=0}^{\infty} \frac{1}{n!} = \frac{1}{1} + \frac{1}{1} + \frac{1}{1 \cdot 2} + \frac{1}{1 \cdot 2 \cdot 3} + \cdots$$

Euler′s number is named after the Swiss mathematician Leonhard Euler, number e is also known as Napier's constant

2. UNIQUE CHARACTERISTICS

1) e can be defined as a unique positive number ′a′ such that the graph of the function y=ax has unit slope at x = 0.[3] The function f(x) = ex is called the (natural) exponential function, and is the unique exponential function equal to its own derivative.

2) There is the remarkable property that if the function e^x (known as the exponential function and also denoted as "exp(x)") is differentiated with respect to x, then the result is the same function e^x

3. APPLICATIONS

1) Compound Interest: The usage of this constant in compound interest was discovered by James Bernoulli in 1683.Bernoulli noticed that an account that would start with 1$ with interest rate R will yield [eRt] dollars after t years with continuous compounding.

2) Derangements: Discovered by Pierre Raymond de Montmort and Bernoulli , e could be applied in derangements. A derangement is a permutation of the elements of a set, such that no element appears in its original position.

3) Standard normal distribution: The normal distribution with zero mean and unit standard deviation is known as the standard normal distribution, given by the probability density function

$$\phi(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}x^2} . \phi(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}x^2} .$$