

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. Its 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:

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

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

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 $f(x) = e^x$ 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

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 e^{Rt} 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

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