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HISTORY AND APPLICATIONS OF PI (π)

Dr. David Rosangliana

ABSTRACT

The ratio of the circumference to the diameter of a circle is represented by the irrational number pi (π). Pi (π) was discovered and calculated thousands of years ago. It is widely used in mathematics and has a lot of practical uses. Although many individuals are familiar with the approximations of Pi (π) and its use in various formulas and theorems, they are unaware of its beauty and potential uses. The goal of the paper is to demonstrate Pi's (π) elegance and practical uses.

HISTORY OF Pi (π) :

Ancient Civilizations (2000 BCE - 500 CE):
Egyptians (2000 BCE) estimated pi (π) as 3.1605 in the Rhind Papyrus. Babylonians (1900 BCE) estimated π as 3.125 in the YBC 7289 clay tablet.

Greek Mathematicians (500 BCE):
- Pythagoras calculated pi (π) using the polygon method.
- Archimedes approximated pi (π) as 3.1418 using the Pythagorean theorem.

Chinese Mathematicians (100 CE):
- Liu Hui calculated pi (π) to 3.1415.
- Zu Chongzhi calculated π to 3.1415926.

Middle Ages (500 CE - 1500 CE):
Arabic Mathematicians refined pi (π) to 3.141592. Indian Mathematicians also contributed to pi (π) calculations.

Renaissance (1500 CE - 1800 CE):
Ludolph van Ceulen calculated pi (π) to 35 digits. Wren used calculus to calculate pi (π).

Modern Era (1800 CE - present):
Computational Advances (1940s): John von Neumann and others used computers.

Record Calculations (2019): Emma Haruka Iwao set record for 31.4 trillion digits.

Several prominent mathematicians, including Archimedes, Liu Hui, Ludolph van Ceulen, John von Neumann and Emma Haruka Iwao, have made contributions to the approximation of Pi (π).

Applications of Pi (π):
When determining the volume, area, and circumference of cylinders, spheres, and circles, pi (π) is a highly helpful tool in geometry. It can be used to solve triangle issues requiring circular functions in trigonometry. Mathematicians can also use it to integrate and differentiate functions that involve Pi (π). In number theory, it can also be applied to modular arithmetic and the study of prime number qualities. It can also be used to solve π-related equations in algebra. Graph theory can also utilize it to explore graphs and circular networks. In probability, it is also employed to model correlations and circular distributions.

When computing force, acceleration, and velocity in circular motion, pi (π) is utilized. Wave mechanics concerns like modeling wave frequency and propagation are also resolved using it. In the study of electromagnetics, it is employed to compute electromagnetic fields and radiation. Schrödinger's equation, which is important for quantum mechanics, also contains it. Relativity also uses it to describe the geometry of spacetime.

In the fields of aerospace engineering, civil engineering, mechanical engineering, electrical engineering, and biomedical engineering, pi (π) is used to design circular trajectories and orbits, bridges, tunnels, and pipelines, as well as to design circular gears and mechanisms, antennas, and filters.

Pi (π) is applied for a variety of purposes, including data compression via pi (π)-based algorithms, modeling circular distributions in artificial intelligence, simulating circular motion and collisions in game development, and displaying circular shapes and curves in graphics.

Planetary orbit calculations in Celestial Mechanics, stellar and galactic motion modeling in Astrophysics, universe expansion description in Cosmology, circular trajectory navigation in Space Exploration, and gravitational field

Assistant Professor
Dept. of Mathematics
Govt. Zirtiri Residential Science College

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modeling in Gravity are all applications of Pi (π).

Pi (π) is used in pharmacokinetics to model drug absorption and distribution, in epidemiology to model disease spread, in population dynamics to model circular growth patterns, in neuroscience to model circular motion in brain activity, and in medical imaging to reconstruct images using pi (π)-based algorithms.

Pi (π) is used for a number of tasks in the field of Statistics, including assessing circular distributions in hypothesis testing, modeling circular uncertainty in Bayesian inference, analyzing directed data in circular statistics, and modeling periodic patterns in time series analysis and regression analysis.

Thus, creating circular structures in architecture, calculating stress and strain in engineering, modeling circular motion in physics, generating circular shapes in computer graphics, and determining distances and directions in GPS navigation are all examples of real-world applications of pi (π). More specifically, Pi (π) could be use in the fields of architecture and construction, energy and utilities, consumer goods, healthcare and medicine, environmental science, computers and information technology, education and research, music, art, sports, navigation, and astronomy. It is highly helpful in software programs like Wolfram Alpha, GeoGebra, Mathematica, MATLAB, and Python (e.g., NumPy, SymPy).

REFERENCE

1. Beckmann, P. (1993). A History of [pi](pi). Barnes & Noble Publishing.
2. 2. Berggren, L., Borwein, J. M., & Borwein, P. B. (2000). Pi: a source book (Vol. 3). New York: Springer.3. “The Joy of Pi” by David Blatner
3. Descartes, R. (1954). The geometry of Rene descartes. Courier Corporation.
4. Jacobs, H. R. (2003). Geometry: seeing, doing, understanding. Macmillan.
5. McKeague, C. P. (2014). Trigonometry. Academic Press.