RAMANUJAN

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Message from Head, Department of Mathematics & Statistics

From last year, our Department started to publish a Departmental Bulletin for the benefits of the students. I am thankful to the Principal, faculties of the department and students who helped in completing the bulletin.

T. K. Saikia

A TRIBUTE TO-
LATE DEBESWAR BARUAH
HEAD, DEPARTMENT OF MATHEMATICS & STATISTICS

FUNDAMENTAL THEOREM OF ARITHMETIC

Priya Banik
B. Com. 5th Semester, Roll No. 32

The unique factorization theorem was proved by Gauss with his 1801 book Disquisitiones Arithmeticae. In this book, Gauss used the fundamental theorem for proving the law of quadratic reciprocity.

In number theory, the fundamental theorem of arithmetic, also called the unique factorization theorem or the unique prime factorization theorem, states that every integer greater than 1 either is prime itself or is the product of prime numbers, and that this product is unique, upto the order of the factors. For example,

1200 = 24 X 31 X 52 = 3 X 2 X 2 X 2 X 2 X 5 X 5 = 5 X 2 X 3 X 2 X 5 X 2 X 2, etc.

The theorem is stating two things : first, that 1200 can be represented as a product of prime and second, no matter how this is done, there ,will always be four 2s, one 3, two 5s and no other primes in the product.

History :

Book VII, proposition 30, 31 and 32, and Book IX, proposition 14 of Euclid' Elements are essentially the statement and proof of the fundamental theorem –

If two numbers by multiplying one another make some number, and any prime number measure the product, it will measure one of the original number.

– Euclid, Elements Book VII, Proposition 30

Proposition 30 is referred to as Euclid's lemma. And it is the key in the proof of the fundamental theorem of arithmetic.

Any composite number is measured by some prime number.

– Euclid Elements Book VII, Proposition 31

Proposition 31 is proved directly by infinite descent

Any number either is prime or is measured by some prime number.

– Euclid, Elements Book VII, Proposition 32

Proposition 32 is derived from proposition 31, and prove that the decomposition is possible.

If a number be the less that a measured by prime number, it will not be measured by any other prime number except those original measuring it.

– Euclid, Elements Book IX, Proposition 14

DR. DHANI RAM BARUAH

Nitu Phukan
5th Semester, Sec B, Roll No. 19

Dr. Dhani Ram Baruah, the Mysteries of Human Genetic Sciences in Heart Diseases and Cancer Panned by non other than him, FRCS (Glasgow), Cardiac Surgeon, Scientist, Bio-Engineer, Pioneer & Chief Cardio-pulmonary Xenotransplant Surgeon, Applied Human Genetic Scientist or Genetic Engineer from the small corner of NE Region of India (Assam).

He is not so popular because he was arrested for conducting xenotransplantation in the lab for alleged violation of Human Organ Transplant using pig heart and he was jailed for 40 days. He is the person in the world to develop mechanical heart valves using zirconium which eleminates various complications that comes with the other types of usually used heart valves. This revolutionary invention established him as a bio-engineer and in the cardio-vascular field earned him the nickname of 'Heart Valve Man'.

He is also the first person in the world to develop stentless mitral and aortic valve mimicking the native heart valve. He is also the first person to demonstrate that pig's heart can be used for transplantation in human. He is also the first person to demonstrate that hyperacute rejection can be overcome by using antigen suppression agent (ASA) which was designed and developed by him more than a decade ago.

He is the first one in the history of artificial heart valves with durability of 92.8 patient year and requires no anticoagulant.

More than 2000 implantations of Baruah Heart Valve have taken place all over the world including Hongkong, China, Phillipines, Germany, Indonesia, India.

Since 1995, working on xenotransplantation using pigs organ as donor, January 1997, performed first successful clinical cluster xenotransplantation using pig heart, lung & kidney to a 32 year old. Who is the first person on the planet to have conducted a xenotransplantation using pig heart. The recipient patient survived for seven long days before finally succumbing to some infections.

Since 1997, involved in research in Applied Human Genetic Engineering for prevention of coronary artery disease, recannalization of diseased coronary and peripheral arteries, hypertension & diabetes using biological molecules isolated from edible medicinal plants of North Eastern region of India.

Dr. Baruah is the one to demonstrate that premature death of human is caused by intracellular calcium and not by otheroma of coronary arteries.

He is the first on this planet to cure dreaded & rarest of the rare diseases. Pancreatic cancer is dreaded incurable disease in history of medical science, but Baruah applied human genetic engineering is the only solution for this purpose.

Baruah said that at a ripe young age the genomic sequencing of a child or an adolescent is studied then it can be ascertained what diseases the child or that adolescent is going to suffer from in the future. He also claims those probable diseases could be prevented.

In 2008, Baruah invented 'Genovac' which is used to eradicate disease before it is expressed at adult stage. This is used at the age of 12-16 years which will not allow the dreaded disease to occur in later part of lifetime.

Dr. Baruah invented prevention & cure of cancer using biological weapon from the medicinal plants of NE Region. Also prevention & cure of HIV & AIDS using biological weapon from the medicinal plants of NE Region.

PYTHAGORAS OF SAMOS

Bikram Lama
B. Com. 5th Semester, Roll No. 10

Greek Mathematician Pythagoras is considered by some to be one of the first great mathematicians. Living around 570 to 495 B.C., in modern day Greece, he is known to have founded the Pythagorean cult, who were noted by Aristotle to be one of the first groups to actively study and advance mathematics. He is also commonly credited with the Pythagorian theorem within trigonometry. However, some sources doubt that is was him who constructed the proof (some attribute it to his students, or Bandhayana, who lived some 300 years earlier in India).

Nonetheless, the effect of such as with large portions of fundamental Mathematics, is commonly felt today, with the theorem playing a large part in modern measurements and technological equipment, as well as being the base of a large portion of other areas and theorems in mathematics. But, unlike most ancient theories, it played a bearing on the development of geometry, as well as opening the door to the study of mathematics as a worthwhile endeavor. Thus, he could be called the founding father of modern mathematics.

INDIAN MATHEMATICIAN BRAHMAGUPTA

Shivani Pandey
B. Com. 5th Semester, Roll No. 2

The great 7th century Indian Mathematician and Astronomer Brahmagupta wrote some important works on both mathematics and astronomy. He was from the state of Rajasthan of north-west India. Most of his works are composed in elliptic verse, a common practice in Indian mathematics at the time and consequently have something of a poetic ring to them.

In his work on arithmetic, Brahmagupta explained how to find the cube and cuberoot of an integer and gave rules facilitating the computation of squares and square roots. He also gave rules for dealing with five types of combinations of fractions. He gave the sum of the squares of the first n natural numbers as n(n+1)(2n+1)/6 and the sum of the cubes of the first n natural numbers as {n(n+1)/2}2.

Brahmagupta's genious, though, came in his treatment of concept of the number zero. Although often also attributed to the 7th century Indian mathematician Bhaskara I, his "Brahmasphutasiddhanta" is probably the earliest known text to treat zero as a number in its own right, rather than as simply a placeholder digit as was done by the Babylonians, or as a symbol for o lack of quantity as was done by the Greeks and Romans.

He established the basic mathematical rules for dealing with zero (1+0=0; 1-0=0), but his understanding of division by zero was incomplete (he thought that 1÷0=0). However the logic 2÷0, 7÷0 etc should also be zero does not explain why – although modern view the a number divided by zero is actually "undefined" (i.e. it doesn't make sense). Previously the sum 3 – 4, for example, was considered to be either meaningless or at nest just zero, but Brahmagupta realized that there must be a thing called the negative numbers and then he expanded on the rules for dealing with negative numbers (e.g. a negative times a negative is a positive, a negative times a positive is a negative, etc.). Furthermore, he pointed let, a quadratic equation (of the type x2+2=11, for example) could in theory has two possible solutions, one of which could be negative because 32=9 and (-3) 2=9.

Brahmagupta even has attempted to write down the rather abstract concepts, using the initials of the names of colours to represent unknown in his equations, which is known to as Algebra. Brahmagupta dedicated a substantial portion of his work to geometry and trigonometry. He established 10 (3.16277) as a good practical approximation for π (3.141593), and also gave the formula, now also known as Brahmagupta formula, for the area of cyclic quadrilateral, as well as celebrated theorem on the diagonals of a cyclic quadrilateral, referred as Brahmagupta's Theorem.

ROMAN MATHEMATICS

Ullash Ghosh
B. Com. 5th Semester, Roll No. 8

By the middle of the 1st century BCE, the Roman had tightened their grip on the old Greek and Hellenistic empire, and the mathematical revolution of the Greeks ground to hall. Despite all their advances in other respects, no mathematical innovations occurred under the Roman Empire and Republic, and there were no mathematicians of note. The Romans had no use for pure mathematics, only for its practical applications, and he Christian regime that followed it (after Christianity became the official religion of the Roman empire) even less so.

Roman Numbers

Number :	1	5	10	50	100	500	1000
Roman :	I	V	X	L	C	D	M

Example : 1944 = MDCCCCXXXXIIII
= MCMXLIV

Roman numbers are well known today, and were the dominant number system for trade and administration in most of Europe for the best part of a millennium. It was decimal (base 10) system but not directly positional, and did not include a zero, so that for arithmetic and mathematical purposes, it was clumsy inefficient system. It was based on letters of the Roman alphabet – I, V, X, L, C, D and M – combines to signify the sum of their values (e.g. VII = V+I+I=7)

Roman Arithmetic : Using Roman Numbers, the sum 1,223 + 1,114 becomes –

MCCXXIII + MCXIV
= MCCXXIII + MCXIIII
M CC XX III
M C X IIII
= MM CCC XXX IIIIIII
= MMCCCXXXVII = 2,337

Later, a subtractive notation was also adopted, where VIIII, for example, was replaced by IX (10 – 1 = 9), which simplified the writing of numbers a little, but made calculation even more difficult, requiring conversion of the subtractive notation at the beginning of a sum and then its re-application at the end (see image above). Due to the difficulty of written arithmetic using Roman Number notation, calculations were usually performed with an abacus, based on earlier Babylonian and Greek abaci.

CONIC SECTION IN THE VICINITY OF LIGHT

Priyanka Mazumdar
B. Com. 5th Semester, Roll No. 4(B)

During a dark night in a dark room, shine a bright torch light with a rounded head on to the floor. Point the torch straight down; we would get a disc shape. Turn it slightly and the disc becomes distorted. If we rotate the torch for enough, the image on the floor will stretch away from us indefinitely. The outline of the shapes formed by the torch on the floor are known as the conic sections : the distorted disc is called an ellipse until it stretches off to infinitely when it becomes a hyperbola. At the precise touch angle for which the ellipse Ibecomes a hyperbola, the special curve produced is known as a parabola.

Since their first discovery, credited to a Greek man Menacchmus from around 350 BCE, conic sections have been observed in a variety of situations. The Earth travels round the sun in the shape of an ellipse, radio dishes and car headlights are parabola shaped because of the light is reflected from their surface.

The Greeks gave the official definition of conic sections as the curves formed through the intersection (sections) of a cone (conic) and a plane. The curves are the outlines of the intersection region. In the example at the beginning, the cone was the beam of the torch, the plane was the floor and the intersection was the image on the floor. It has since proved most consistent to define the conic sections are the curves formed through intersections of a plane and two cones, one above the other.

FATHER OF GEOMETRY

Angkita Borpatra Gohain
B. Com. 5th Semester, Roll No. 05(B)

Euclid, sometimes called Euclid of Alexandria, was a Greek mathematician. He was born in mid 4th century BCE and died in Mid 3rd century BCE. He is generally known for – Euclidean geometry, Euclid's elements, Euclidean algorithm.

His major study, 'Elements', had collected the word of many mathematics who preceded Euclid. In his method, 'deductions' are made from premises or axioms, Aristotle modified his deductive method and used for demonstrating scientific certitude (truth) until 17th century. Elements was the most comprehensive and logically rigorous examination of the basic principles of geometry. Elements was reintroduced to Europe in 1120.

It is very necessary to understand the concept of Axiomatic system, as without the knowledge of Axiomatic systems, its become very difficult to understand elements of Euclid's. System of Axiomatic consist of a collection of undefined terms, a collection of definition, postulates and finally a collection of theorems. Theorems are proved by the statement of logical conclusion of a combination of axioms, definition and undefined terms. His undefined terms were point, line, straight lines, surface and plane.

Again, Euclid Axioms are divided into two calegories-

a) Postulates, and b) Common Notion

Euclid followed ten (10) axioms. Some of them are-

(i) It is possible to draw a straight line from any point to any point
(ii) It is possible to extend a finite straight line to continuously straightline
(iii) It is possible to create a circle.
(iv) All wight angles are equal to one another.
(v) The whole is greater than the part.

MILLENNIUM PRIZE PROBLEMS

Amrit Maheswari
B. Com. 5th Semester, Roll No. 6

The Millennium Prize Problems are seven problems in mathematics that were stated by the Clay Mathematics Institute (CMI) in 2000. These seven problems are considered by CMI to be important classic questions that have resisted solution over the years. Someone who can solve just one of these problems receives 1 million USD. For each problem, the CMI had a professional mathematician write up an official statement of the problem which will be the main standard by which a given solution will be measured against. The only solved problem is the Poincare Conjecture, which was solved by Grigori Perelman in 2003. The problems are :-

1) The Birch and Swinnerton-Dyer Conjecture :
The official statement was given by Andrew Wiles.
2) The Hodge Conjecture :
The official statement was given by Pierre Deligne.
3) Navier-Stokes Existence and Smoothness :
The official statement was given by Charles Fifferman.
4) P versus NP problem :
The official statement was given by Stephen Cook.
5) The Poincare Conjecture :
The official statement was given by John Milnar.
6) The Riemann Hypothesis :
The official statement was given Enrico Bembieri.
7) Yang-Mills Existence and Mass GAP. :
The official statement was given by Arthur Jaffe and Edmard Witten.

"It is the desire for truth and the response to the beauty and elegance of Mathematics that drives Mathematician."
– LANDON CITY, benefactor of the Clay Millennium Problems.

Do you know ?

Sumit Dutta
B. Com. 5th Semester, Roll No. 29

1. 0.999=1

Proof : Let, $N = 0.999$

$\Rightarrow 10N = 9.99$

$\Rightarrow 10N - N = 9.99 - N$

$\Rightarrow 10N - N = 9.99 - 0.99$

$\Rightarrow 9N = 9$

$\Rightarrow N = 1$

$\Rightarrow 0.999 = N = 1$

2. 111111111 X 111111111 = 12345678987654321

3. $12 + 3 - 4 + 5 + 67 + 8 + 9 = 100$

4. What comes after a million, billion and trillion ? A quadrillion, quintillion, sextillion, septillion, octillion, nonillion and endecillion.

5. The word hundred is derived from the word "hundrath", which actually means 120 and not 100.

6. If we write out pi to two decimal places, backward it spells "pie" ᔭΓ.Ɛ

7. Beauty of Maths-

6 X 7 = 42
66 X 67 = 4422
666 X 667 = 444222
6666 X 6667 = 44442222
66666 X 66667 = 4444422222
666666 X 666667 = 444444222222
6666666 X 6666667 = 44444442222222
66666666 X 66666667 = 4444444422222222

VINOD BEGARI JOHRI

Ajit Gupta
B. Com. 5th Semester, Roll No. 2

Vinod Behari Johri was born in Etah (Uttar Pradesh), India on 10 June, 1935. His father Dr. Bhairon Prasad Johri graduated from Veterinary College, Patna and worked as Livestock Officer, Allahabad, India. Vinod's mother, Sarojini Johri was a homemaker. Johri completed his high school atNarain College, Shikohabad, India, with the 12th rank in the state merit list. He was awarded first prize in Chiranjeevi Dhiri Singh Provincial English Debate. He completed his Bachelor's in 1953 and Marter's in Applied Mathematics in 1956 from Allahabad University scoring high ranks in the merit list.

In 1957 he was appointed as Assistant Professor in the Department of Mathematics, Allahabad University, Allahabad. In 1960, Johri was appointed Assistant Professor in Mathematics lat Gorakhpur University, Gorakhpur, India, where he was conferred Ph. D. degree in 1966 on his thesis "Gravitational waves in Bondi Space Time".

In 1967 Johri was awarded Commonwealth Fellowship for Post Doctorate work at Department of Mathematics and Theoretical Physics at Cambridge University (UK) where he worked in close collaboration on cosmological problems with Dr. Dennis Sciama and research scholars Friedrich Hehl, Fernando de Felice.

Vinod was an eminent cosmologist, a retired professor of astrophysics at Indian Institute of Technology, Madras and emeritus professor at Lucknow University since 1995. V. Johri had over 75 research publications ,and articles published in pioneering journals. His major contributions in cosmological research included ' Power Law Inflation, Genesis of quintessence fields of dark energy and phantom cosmologies'. He was the co-author of the first model ;of power law inflation in Brans-Dicke Theory along with C. Mathiazhagan.

LEONHARD EULER

Akash Sahu
B. Com. 5th Semester, Roll No. 20(B)

Leonhard Euler was an 18th century physicist and scholar who was responsible for developing many concepts that are an integral part of modern mathematics.

Synopsis :

Born on April 15, 1707 in Basil, Switzerland, Leonhard Euler was one of math's most pioneering thinkers, establishing a career as an academy scholar and contributing greatly to the fields of geometry, trigonometry and calculus, among many others. He released hundreds of articles and publications during his lifetime and continued to publish often losing his sight. He died on September 18, 1783.

Early life and Education :

Leonhard Euler was born on April 15, 1707 in Basil, Switzerland. Though originally stated for a career as a rural clergyman, Euler showed an early aptitude and propensity for mathematics, and thus, after studying with Johan Bernoulli, he attended the University of Bernoulli, he attended the university of Basel and earned his master's during his teens. Moving to Russia in 1727, Euler served in the many before joining the St. Petersburg Academy as a professor of physics and later heading its mathematics division.

He wed Katharina Gsell in early 1734 with the couple going to have many children, though only five lived past their father. The couple were married for 39 years until Katharina's death, and Euler remarried in his later years to her-self sister. In 1736, he published his first book of many Mechanica. By the end of the decade having suffered from fevers and overexertion due to cartography hampered in the ability to see from his right eye.

Heads Academy of Science :

In the mid 1740s, Euler was appointed the mathematics director of the newly created Berlin Academy of Science and Beaus Arts, taking on a variety of management roles as well becoming head of the organization itself for a time starting in 1759. Not appointed president proper of the Academy by King Frederick II, Euler received patronage from Catherine II and in 1766 returned to Russia to head the St. Petersburg Academy.

By the early 1770s Euler had lost his sight completely after not allowing for proper recuperation after an operation. Yet, with a mind that reminded highly agile, he was able to continue his scientific work and with assistance published scores of articles.

Revolutionary Principles :

Over his career, Euler came up with an array of principles which laid the foundation for much of modern mathematics as we know it. He was a revolutionary thinker in the fields of geometry, trigonometry, calculus, differential equations, number theory including the utilization of π and $f(x)$ among a legion of other accomplishments.

Death and Legacy :

Euler, working of the day of his passing suffered from a brain hemorrhage and died during the night of September 18, 1783, in St. Petersburg.

Euler's legacy has been enormous in terms of shaping the modern playing field of mathematics and engineering, with his work highlighted by the Mathematical Association of America and honored by mathematicians around the world. A massive project that has taken more than a century to complete, Leonhardi Euleri Opera Omnia is a full presentation of his work and has had dozens of volumes published over the years. The last two Opera Omnia volumes are tentatively scheduled for a 2014 release date.

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