

QUANTUM THE MATHEMATICAL GAZETTE

FROM THE EDITORS' DESK

2011 has been a big year. Literally. Between the world population hitting seven billion, Osama Bin Laden's assassination, uprisings in the Middle East and Kate Middleton's wedding dress, there certainly was a lot to talk about.

2012. The year of Maths. The year of the apocalypse. Coincidence? We sincerely hope so.

It has been an eventful year for the tiny element in the field of máthēma, that is the Mathematics department of Lady Shri Ram College. From the tiny disaster we had on our hands in the form of the semester system, to the National Seminar on Differential Equations and Modeling, to a department trip that seems to have a mind of its own.

For the first years, the past 2 semesters seem to have passed in a haze of assignments, projects, impossible course loads, bizarre date sheets and even more bizarre marks. The second years, sandwiched between the 2 experimental batches, were the luckiest of the lot.

Drawing gains from the toils of their seniors, they revel in their brilliant results and the chance to enjoy life.

Us, the third years. The past 3 years may have been the most demanding of our lives, but we came through like true heroes. We studied more than we had all our life put together but we also had just as much, if not more, fun. These past few days seem like a race to the finish and there's a conflict to both fast forward and rewind, within each of us.

The newsletter is partly a culmination of the year gone by, partly a medium of showcasing our talent beyond the spectrum of Maths and partly proof that we mathematicians too have our fair share of fun. There was no way Quantum would have ever seen the light of day without the unstinting support of our Staff Advisor, Ms. Ranjana Jain, our Head of Department, Ms. Monika Singh, along with every single teacher of our department.

So hop on, we're buying you a ticket to a world of literature and opinions and 'pahelis' and 'gandit'. Do write to us at mathnewsletter@gmail.com with your feedback. Hope you enjoy the ride!

Editors: Surabhi Khanna, Priya Prakash & Abhishri

Aggarwal

"Be the change you wish to see in the world"
- Mahatma Gandhi

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Take a walk down memory lane with the 3rd Years

The Department of Mathematics always strives to explore various aspects of the subject, permeate critical thinking amongst the students and provide opportunity to foster intelligence, talent and understanding by organising seminars, workshops, invited lectures. To fulfill its objective the department organised the following activities in the academic year 2011-2012.

WORKSHOPS AND SEMINARS

- This year the department took the initiative to organize a **National Workshop and Training Program** for teachers of different universities of India teaching at undergraduate level on '**Differential Equations and Mathematical Modeling**' from February 9 to February 11, 2012 which was funded by U.G.C., N.B.H.M. and C.S.I.R. The workshop witnessed the presence of eminent Mathematicians like Dr. Sandeep K. Juneja, School of Technology and Computer Science, TIFR, Mumbai; Prof. Adimurthi, Department of Mathematics, TIFR, Bangalore; Dr. Pranay Goel, Department of Mathematics, IISER, Pune; Dr. Vivek Kumar, Department of Applied Mathematics, DTU, Delhi; Dr. Mani Mehra, Department of Mathematics, IIT, Delhi; Prof. S. V. Raghurama Rao, Department of Aerospace Engineering, IISc, Bangalore. Prof. Kum Kum Dewan, Department of Mathematics, Jamia Millia Islamia University, Delhi was the Guest of Honour of the workshop.

The aim of the three-day workshop was to develop awareness and foster the essence of mathematical modeling and also provide participants with hands-on experience.

The Workshop witnessed the participation of more than 45 people, out of which there were 28 college teachers from Delhi and 9 college teachers from various states of India like Tamilnadu, Odisha, Punjab, Rajasthan and Haryana.

- The Department of Mathematics continued its collaboration with the Department of Bachelor of Elementary Education to organize an 8 week certificate course started on February 15, 2010, on '**Modeling with Spreadsheets**' with Dr. Jonaki B. Ghosh, Department of Elementary Education, Lady Shri Ram College as the resource person.

On the 1st and 2nd of November, 2011, a team of four students from IIIrd year including Sakshi, Manushi, Prashna and Shefali, under the guidance of Mr. Mahesh, conducted a workshop on '**LaTeX**' which is a high-quality typesetting system mandatory for writing research papers in Mathematics.

TALKS

- To give the feeling of ease to its first year students, the Department organized a talk by Prof. Hukum Singh, Professor and Head, Department of Education and Mathematics, NCERT, on "Transition from school to college mathematics" on August 2, 2011.
- To enhance the understanding of algebra and also to enable the students to overcome the phobia of algebra, a talk on "Algebraic equations of arbitrary degree" by Dr. Maneesh Thakur, Department of Mathematics, Indian Statistical Institute, Delhi on October 20, 2011 was organised.



Some pictures from the National Seminar!



HORIZON

The Department's Annual Inter College Mathematical Meet 'Horizon' was held on September 17, 2011. The day was packed with a talk and five interesting events that had been conceptualized and carefully planned out by the students of the Math Department with help from their Teachers. The inaugural talk was delivered by Prof. R. B. Bapat. The meet witnessed tremendous amount of participation from faculty members and students from many other colleges of the University. The events that took place during the day included Quiz, What's the good word, Click-o-maths and Mathematical Tambols.



Horizon!

PUBLICATIONS

The Department endeavours to provide a platform to the students as well as teachers for publishing their ideas and mathematical concepts. In this regard, the department has published its annual mathematics journal '**Éclat**'. This volume not only contains articles from mathematics department of LSR, but also articles from different departments of LSR including History and Statistics which highlight the interdisciplinary aspect of mathematics, and also articles from faculties other than LSR.

The department has also published its newsletter '**Quantum**', which presents an overview of the departments activities, experiences of students, mathematical and non-mathematical articles and poems by students.

ANUPAMA DUA PAPER PRESENTATION

The 'Anupama Dua Paper Presentation and Scholarship Function' was held on January 11, 2012 giving a platform and thus exposing the students to the art of paper presentation. In this function scholarships are awarded to the students scoring the first and second position in the University examinations in the 1st and 2nd year.

This year, Krishma Babar and Ekta Shrama were awarded scholarship of Rs. 4,000 each for securing first position in 2nd and 1st year respectively; and Aradhana Narang, Aparna Mehra and Kirti were awarded scholarship of Rs. 3,500 each for securing second position in 1st and 2nd year respectively.



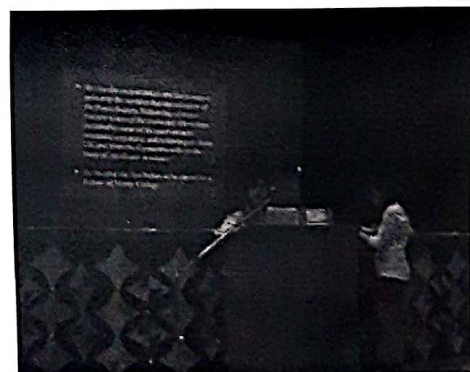
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DEPARTMENT ASSEMBLY

The dept. assembly took place on the 21st of March 2012. The assembly was dedicated to renowned Indian mathematician Ramanujan on account of the year 2012 marking his 150th birth anniversary. The programme

began with an invocation dance performed by Shreya Aggarwal.

It was followed by a presentation on the life of Ramanujan. There was then a Bharatnatyam performance entitled 'Manmohini' by third year student Apurva Dey. The assembly concluded with a musical performance of the song 'Azaadiyan' chosen specifically as it was thought to aptly illustrate Ramanujan's struggles. It was greatly enjoyed by all those present and the event was declared a success.



FRESHERS PARTY

The Freshers Party is an event awaited by students of all years. It provides all the first years an opportunity to interact with their seniors and have fun at the same time. This year's Freshers Party took place on the 3rd of August and had 'Carnival' as its theme. The theme was reflected in the decor and the attire of the first years. The party commenced with the welcoming the new batch followed by their individual introductions. The atmosphere was made joyful and lively by the performances of the 2nd and 3rd years. Not to be left behind, the teachers too showed their talents. The party ended with the announcement of Miss Fresher and Miss Best Dressed.



ALEPH NAUGHT

"Relations between pure and applied mathematicians are based on trust and understanding. Namely, pure mathematicians do not trust applied mathematicians, and applied mathematicians do not understand pure mathematicians." - Anonymous

ARTICLES IN THE SECTION :

- Mathematics and the Stock Market - Priya Prakash , 3rd year
- Life of Ramanujan - Payal Raj , 2nd Year
- ...And everything spirals down to Math- Megha Baid, 1st Year
- Fields Medal- The Nobel Prize for Mathematics - Anisha Anil Juneja , 1st Year
- History Of Indian Mathematics -Ayushi Singhal , 1st Year
- Quotes - Nandita Mahant, 1st Year



MATHEMATICS AND THE STOCK MARKET - PRIYA PRAKASH, 3RD YEAR

Introduction:

The Stock Market is a very complex yet interesting area whose dynamic nature has puzzled many an analyst and economist for years. Some have figured out how to handle it's ups and downs , how to ride stock market trends , which stocks to pick , what kind of trade to make in what quantity and at what time. These people are a few, but have earned great returns for what they have done. But all is not as rosy as it looks. Buying and Selling, Supply and Demand might seem simple at first but these very concepts have a lot of research behind them. Prediction in the market isn't a guessing game or a stroke of luck; it is a science that involves mathematical concepts amongst many other things. This article will discuss a few aspects of how to interpret and technically analyze the market through a simple mathematical concept.

Basic Definitions: Share/Security: Is generally a small piece of ownership of the company in Question. Also known as **Stock**.

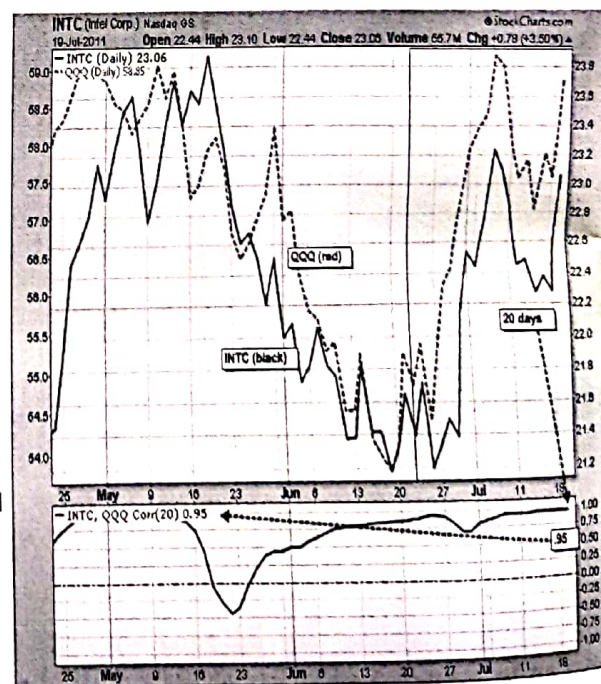
Indicator: Statistics used to measure current conditions as well as to forecast financial or economic trends. Indicators are used extensively in technical analysis to predict price patterns. They are plotted on a Price vs. Time graph, against a Stock.

Index: A kind of Indicator that takes the average price of a bunch of companies and plots them as Price vs. Time, against a Stock.

Correlation Analysis : In financial terms, Correlation is a statistical measure of how two securities move in relation to each other. The resulting value is called the **Correlation Coefficient** which shows if changes in one variable results in change in another. It is the result of a mathematical comparison of how closely related two variables are. One variable is dependant and the other independent. In our context we use an Indicator or an Index as the independent variable and the dependant variable as the price of the security.

The correlation coefficient can range between ± 1 . A +1 represents a **Perfect Positive Correlation** which means that changes in the independent variable will result in an identical change in the dependant variable i.e. Change in the Indicator/Index will result in an identical change in the security's price. Similarly -1 represents '**Perfect Negative Correlation**' which also represents identical change except the change is in the opposite direction. 0 means there is no relationship between Indicator and Security. A Low Correlation ($< \pm 0.10$) suggests the relationship is weak or non-existent and a High One (± 0.80) suggests high likelihood of the variables changing together.

If there is **Perfect Positive Correlation** between an Indicator and a Security, then that Indicator can be useful in predicting the way the Security is moving in the market, hence giving a pretty accurate idea on when it is going up or down, or when to buy or sell in order to make profit. Hence when the Indicator goes up, we can expect the price of the stock to go up too. So we buy at this point and sell for a profit when the stock has



security over time and the QQQ Indicator. We can see how there is a High correlation between the two. At the beginning of May, when the price of the Intel stock is around 58 the value of the QQQ Indicator is at a high of 59. Hence we can expect the price of Intel stock to go up.

On the basis of what we've learnt, if we buy the stock around the first of May, sure enough on the 23rd it touches a new high above 59; just as predicted by the QQQ and we can sell it for a profit!

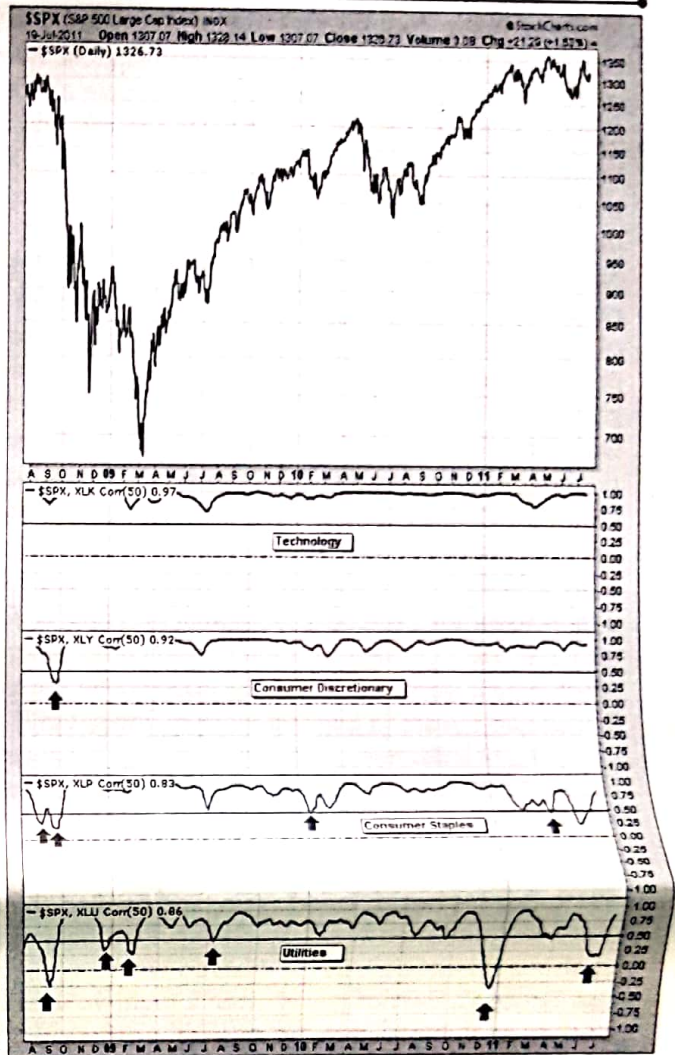
Similarly Oil stocks and oil are positively correlated most of the time. A value above 0.50 of the Correlation Coefficient is said to point towards a positive Correlation.

Divergence

If there is a **Perfect Negative Correlation** or just a negative Correlation, we can use it to figure out if two securities or an index and a security are completely unrelated. If a security and an indicator have negative correlation we can check the indicator and whenever it has an upward trend, we can expect a downward trend in the security. Hence it can be important to identify buy and sell signals.

As an example, let consider the S&P 500 which is a popular Index consisting of 500 companies from diverse sectors like Technology, Consumer Discretionary, Consumer Staples and Utilities. But some sectors listed in it are more correlated to the overall Index than others. To see this we can observe the Graph on the right. This shows us that consumer staples and utilities sectors are less correlated to the S&P 500 than the consumer discretionary and technology sectors. Hence If we want to buy the stock of a Technology company, it would be helpful to look at the movement of the S&P 500 Index. If it is going up, then we can expect the price of the stock to go up and vice versa. But if we want to buy the stock from the Utilities sector, if the S&P went down, we could expect its price to go up; hence using the divergence criteria to analyze it. Just as we did in the pre-

Conclusion: We can hence get a general idea of how one mathematical concept can be used to analyze the market better and help us in attaining positive results while buying and selling stock on the market. I hope this small example helps you in getting a better insight on technical analysis in the Stock Market and generates some interest in the field.



LIFE OF RAMANUJAN - PAYAL RAJ , 2nd YEAR

Srinivasa Ramanujan (1887-1920) introduced to the mathematical world. Born in South India, Ramanujan was a promising student, winning academic prizes in high school. But at age 16 his life took a decisive turn after he obtained a book titled *A Synopsis of Elementary Results in Pure and Applied Mathematics*. The book was simply a compilation of thousands of mathematical results, most set down with little or no indication of proof. It was in no sense a mathematical classic; rather, it was written as an aid to coaching English mathematics students facing the notoriously difficult Tripos examination, which involved a great deal of wholesale memorization.

But in Ramanujan it inspired a burst of feverish mathematical activity, as he worked through the book's results and beyond. Unfortunately, his total immersion in mathematics was disastrous for Ramanujan's academic career: ignoring all his other subjects, he repeatedly failed his college exams.

As a college dropout from a poor family, Ramanujan's position was precarious. He lived off the charity of friends, filling notebooks with mathematical discoveries and seeking patrons to support his work. Finally he met with modest success when the Indian mathematician Ramachandra Rao provided him with first a modest subsidy, and later a clerkship at the Madras Port Trust. During this period Ramanujan had his first paper published, a 17-page work on Bernoulli numbers that appeared in 1911 in the *Journal of the Indian Mathematical Society*.

Still no one was quite sure if Ramanujan was a real genius or a crank. With the encouragement of friends, he wrote to mathematicians in Cambridge seeking validation of his work. Twice he wrote with no response; on the third try, he found Hardy.

Hardy wrote enthusiastically back to Ramanujan, and Hardy's stamp of approval improved Ramanujan's status almost immediately. Ramanujan was named a research scholar at the University of Madras, receiving double his clerk's salary and required only to submit quarterly reports on his work. But Hardy was determined that Ramanujan be brought to England. Ramanujan's mother resisted at first—high-caste Indians shunned travel to foreign lands—but finally gave in, ostensibly after a vision. In March 1914, Ramanujan boarded a steamer for England.



Ramanujan's arrival at Cambridge was the beginning of a very successful five-year collaboration with Hardy. In some ways the two made an odd pair: Hardy was a great exponent of rigor in analysis, while Ramanujan's results were (as Hardy put it) "arrived at by a process of mingled argument, intuition, and induction, of which he was entirely unable to give any coherent account". Hardy did his best to fill in the gaps in Ramanujan's education without discouraging him. He was amazed by Ramanujan's uncanny formal intuition in manipulating infinite series, continued fractions, and the like: "I have never met his equal, and can compare him only with Euler or Jacobi."

One remarkable result of the Hardy-Ramanujan collaboration was a formula for the number $p(n)$ of partitions of a number n . A partition of a positive integer n is just an expression for n as a sum of positive integers, regardless of order. Thus $p(4) = 5$ because 4 can be written as $1+1+1+1$, $1+1+2$, $2+2$, $1+3$, or 4. The problem of finding $p(n)$ was studied by Euler, who found a formula for the generating function of $p(n)$ (that is, for the infinite series whose n th term is $p(n)x^n$). While this allows one to calculate $p(n)$ recursively, it doesn't lead to an explicit formula. Hardy and Ramanujan came up with such a formula (though they only proved it works asymptotically; Rademacher proved it gives the exact value of $p(n)$).

Ramanujan's years in England were mathematically productive, and he gained the recognition he hoped for. Cambridge granted him a Bachelor of Science degree "by research" in 1916, and he was elected a Fellow of the Royal Society (the first Indian to be so honored) in 1918. But the alien climate and culture took a toll on his health. Ramanujan had always lived in a tropical climate and had his mother (later his wife) to cook for him: now he faced the English winter, and he had to do all his own cooking to adhere to his caste's strict dietary rules. Wartime shortages only made things worse. In 1917 he was hospitalized, his doctors fearing for his life. By late 1918 his health had improved; he returned to India in 1919. But his health failed again, and he died the next year.

Besides his published work, Ramanujan left behind several notebooks, which have been the object of much study. The English mathematician G. N. Watson wrote a long series of papers about them. More recently the American mathematician Bruce C. Berndt has written a multi-volume study of the notebooks. In 1997 The Ramanujan Journal was launched to publish work "in areas of mathematics influenced by Ramanujan".

...AND EVERYTHING SPIRALS DOWN TO MATH- MEGHA BAID, 1st YEAR

'The staunchly-punk, time-signature-juggling, nerdy instrumentalist mayhem of math rock.'

Math-rock, as its name suggests, is a rhythmically complex-guitar based style of experimental rock. It is characterized by complex, atypical rhythmic structures including irregular stopping and starting, angular melodies and dissonant chords. Math rock is a sound which can be traced back to the American hardcore scene of the late 80's. Wanting to employ hardcore elements- speed, tightness, dissonance, volume -in more abstract interesting ways, a scene developed in which bands play irregular rhythms and unconventional guitar fragments in sharp, precise ways.

Where rock 'n' roll is eternally struck in 4/4 time, math rock bands deliberately employ strange meters like 7/8 and 11/8. The bands flaunt virtuosity as a unit, turning on a dime and breaking in new, unexpected directions. TOOL is one such American rock band describes as "the thinking person's metal band. Cerebral and visceral, soft and heavy, melodic and abrasive, tender and brutal, familiar and strange, western and eastern, beautiful and ugly, taut yet sprawling and epic, they are a tangle of contradictions."

'Lateralus' is a song by the band, known for its distinct time signatures and corresponding lyrical patterns. The time signatures of the chorus of the song change from 9/8 to 8/8 to 7/8 as drummer Danny Carey says, "It was originally titled 9-8-7 for time signatures. Then it turned out that 987 was the 17th number of the Fibonacci Sequence. It is also apparent that the lyrics are arranged in ascending and descending order of the Fibonacci Sequence, which is 1,1,2,3,5,8,

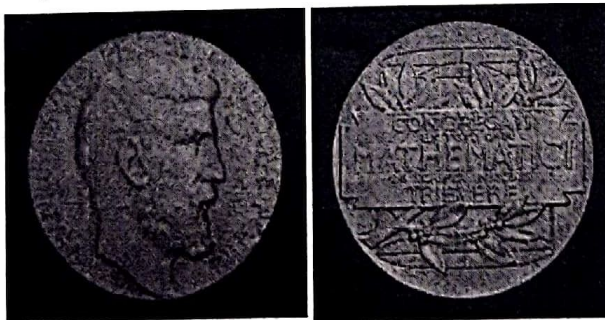
based on their syllables. Counting between pauses, the syllables in Maynard James Keenan's vocals during the verse form the first few Fibonacci numbers, ascending and descending:

[1] Black
[1] then
[2] white are
[3] all i see
[5] in my infancy
[8] Red and ye.llow then came to be
[5] reaching out to me
[3] let me see
[2] There is,
[1] so,
[1] much,
[2] more and
[3] be.ckons me
[5] to look through to these
[8] in.fi.nite pos.si.bil.i.ties
[13] As be.low so a.bove and be.yond i im.ag.ine
[8] drawn bey.ond the lines of rea.son
[5] Push the en.ve.lope
[3] Watch it bend.

The Fibonacci Sequence shares a relationship with the golden spiral, which might be what 'spiral' mentioned several times later in the lyrics is referring to. In fact, the syllables length itself spirals-in and spirals-out on the sequence 1,1,2,3,5,8,5,3,2,1,1,2,3,5,8,13,8,5,3. Additionally, Keenan begins singing at 1:37 into the song. 1 minute 37 seconds or 97 seconds which is approximately 1.618 minutes. This happens to be the golden ratio.

FIELDS MEDAL- THE NOBEL PRIZE FOR MATHEMATICS—ANISHA ANIL JUNEJA , 1ST YEAR

The Fields Medal, officially known as International Medal for Outstanding Discoveries in Mathematics, is a prize awarded to two, three, or four mathematicians not over 40 years of age at each International Congress of the International Mathematical Union (IMU), a meeting that takes place every four years. The colloquial name is in honour of Canadian mathematician John Charles Fields. Fields was instrumental in establishing the award, designing the medal itself, and funding the monetary component. The Fields Medal greatest honour a mathematician can receive. It comes with a C\$15,000. The medal was designed by Canadian sculptor R. Tait McKenzie. On the obverse is the inscription (in Latin): "Transire suum pectus mundoque potiri" (Rise above oneself and grasp the world).



monetary award, which since 2006 is first awarded in 1936 to Finnish mathematician Lars Ahlfors and American mathematician Jesse Douglas, every four years since 1950. Its purpose is to give recognition and support to younger mathematical researchers who have made major contributions.

Canadian sculptor R. Tait McKenzie. is Archemedis and a quote attributed

On the reverse is the inscription (in Latin):

CONGREGATI
EX TOTO ORBE
MATHEMATICI
OB SCRIPTA INSIGNIA
TRIBUERE

•Translation: "Mathematicians gathered from the entire world awarded [understood "the winners"] for their outstanding writings." In the background, there is the representation of Archimedes' tomb with the carving illustrating his theorem

on the sphere and the cylinder, behind a branch. The rim bears the name of the prizewinner.

The Fields Medal is often described as the "Nobel Prize of Mathematics" for the prestige it carries, though in most other ways the relatively new Abel Prize is a more direct analogue. In contrast with the Nobel Prize, the Fields Medal is awarded only every four years. The Medal also has an age limit: a recipient's 40th birthday must not occur before January 1 of the year in which the Fields Medal is awarded. The 40-year rule is based on Fields' desire that

"... while it was in recognition of work already done, it was at the same time intended to be an encouragement for further achievement on the part of the recipients and a stimulus to renewed effort on the part of others."

The latest Fields Medal was awarded in 2010. For the first time, the ceremony was conducted in India, in Hyderabad. The medal was awarded to Elon Lidenstrauss, Ngo Bao Chau, Stanislav Smirnov and Cedric Villani. The next ceremony is to be conducted in 2014 in Seoul.

It is a pity that no Indian till now has won this prestigious award. I sincerely hope to see an Indian mathematician awarded with it at Seoul in 2014.

HISTORY OF INDIAN MATHEMATICS - AYUSHI SINGHAL , 1st YEAR

MATHEMATICS has played a significant role in the development of Indian culture for millennia. Mathematical ideas that originated in the Indian subcontinent have had a profound impact on the world.

In ancient time, mathematics was mainly used in an auxiliary or applied role. Thus, mathematical methods were used to solve problems in architecture and construction (as in the public works of the Harappa civilization), in astronomy and astrology (as in the words of the Jain mathematicians) and in the construction of Vedic altars (as in the case of the Shulba Sutras of Baudhayana and his successors). By the sixth or fifth century BCE, mathematics was being studied for its own sake, as well as for its applications in other fields of knowledge.

There does not seem to have been a time in Indian history when mathematics was not being developed. Recent work has unearthed many manuscripts, and what were previously regarded as dormant periods in Indian mathematics are now known to have been very active. The Indus valley civilization is considered to have existed around 3000 BCE. Two of its most famous cities, Harappa and Mohenjo-Daro, provide evidence that construction of buildings followed a standardized measurement which was decimal in nature. Here, we see mathematical ideas developed for the purpose of construction. This civilization had an advanced brick-making technology (having invented the kiln). Bricks were used in the construction of buildings and embankments for flood control. The Shulba Sutras introduce the concept of irrational numbers, numbers that are not the ratio of two whole numbers. For example, the square root of 2 is one such number. The sutras give a way of approximating the square root of number using rational numbers through a recursive procedure which in modern language would be a 'series expansion'.

This predates, by far, the European use of Taylor series.

It is interesting that the mathematics of this period seems to have been developed for solving practical geometric problems, especially the construction of religious altars. However, the study of the series expansion for certain functions already hints at the development of an algebraic perspective. In later times, we find a shift towards algebra, with simplification of algebraic formulae and summation of series acting as catalysts for mathematical discovery.

No account of Indian mathematics would be complete without a discussion of Indian numerals, the place-value system, and the concept of zero. The numerals that we use even today can be traced to the Brahmi numerals that seem to have made their appearance in 300 BCE. By 600 CE, a place-value decimal system was well in use in India. This means that when a number is written down, each symbol that is used has an absolute value, but also a value relative to its position. For example, the numbers 1 and 5 have a value on their own, but also have a value relative to their position in the number 15. The importance of a place-value system need hardly be emphasized. It would suffice to cite an often-quoted remark by La-place: *'It is India that gave us the ingenious method of expressing all numbers by means of ten symbols, each symbol receiving a value of position as well as an absolute value; a profound and important idea which appears so simple to us now that we ignore its true merit. The elevation of zero to the same status as other numbers involved difficulties that many brilliant mathematicians struggled with. The main problem was that the rules of arithmetic had to be formulated so as to include zero. While addition, subtraction, and multiplication with zero were mastered, division was a more subtle question. Today, we know that division by zero is not well-defined and so has to be excluded from the rules of arithmetic. But this understanding did not come all at once, and took the combined efforts of many minds.'*

The most famous names of Indian mathematics belong to what is known as the classical era. This includes Aryabhata I. One of Aryabhata's discoveries was a method for solving linear equations of the form

$ax + by = c$. Here a , b , and c are whole numbers, and we seek values of x and y in whole numbers satisfying the above equation. For example if $a = 5$, $b = 2$, and $c = 8$ then $x = 8$ and $y = -16$ is a solution. In fact, there are infinitely many solutions:

$$x = 8 - 2m$$

$$y = 5m - 16$$

where m is any whole number, as can easily be verified. Aryabhata devised a general method for solving such equations, and he called it the *kuttaka* (or pulverizer) method. He called it the pulverizer because it proceeded by a series of steps, each of which required the solution of a similar problem, but with smaller numbers. Thus, a , b , and c were pulverized into smaller numbers.

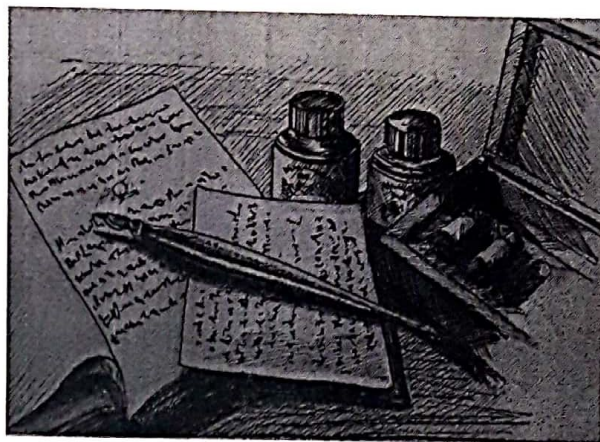
In short, the contributions of mathematicians such as Aryabhata, Bhaskara, Bhramagupta, Shridhara etc. have made India's presence felt in the world of Mathematics.

LYCEUM LITERATI

"Why not seize the pleasure at once, how often is happiness destroyed by preparation, foolish preparations." Jane Austen

ARTICLES IN THE SECTION

- Austen, not the capital of Texas - Abhishri Aggarwal, 3rd year
- Utility of Development Programmes- Sanya Sehgal, 3rd Year
- A Certain Ambiguity: Book Review - Akanksha Mittal, 2nd Year
- Lessons learnt from Yoda—Surabhi Khanna, 3rd Year
- Kiran— Aradhana Narang, 3rd Year
- Reality and Hope—Upasna Gaba, 3rd year
- To be or not to be—Gaurangna Madan, 3rd year



AUSTEN, NOT THE CAPITAL OF TEXAS - ABHISHRI AGGARWAL, 3RD YEAR

I was first introduced to Jane (we're old friends, first name basis) when I was about 11 or 12. I found an abridged version of *Pride and Prejudice* lying around the house and started reading it because at that age I pretty much read whatever I could lay my hands on (including one exceptionally confusing episode with a certain Mr. Rushdie but that's another story.)

Mrs. Bennet, with her nerves and her desperate need to marry off her five daughters, amused me no end as she was not so very different from a great many women who happened to play supplementary roles in the book that was my life. I always found Mr. Bingley a little daft, if you'd pardon the language, loved Mr. Wickham only to grow to hate him and hated Mr. Darcy only to grow to love him. Eliza Bennet always annoyed me a little but that was only because I was secretly jealous of her sharp wit and her ability to spring the most brilliant comebacks. I could go on and on and never stop.

I did nag my mother to buy me the unabridged version only to find the language way beyond my comprehension. I stuck to reading and re-reading my abridged version till along came *Harry Potter* and that was the end of that. A few years ago, I happened to chance upon the *Pride and Prejudice* BBC television series. Let's just say I got more than twice the worth of the money spent. By then I had discovered the joys of piratebay and went on to download each and every single television/movie adaption of each and every single Austen book ever written. I went through the lot in about 2 days.

I then proceeded to pull out the dusty unused, unabridged version of *Pride and Prejudice* and swallow it whole. I soon went on to *Mansfield Park*, (love Fanny Price!) then *Northanger Abbey*, *Persuasion*, (my personal favourite) *Emma* and last, and for me definitely the least, *Sense and Sensibility*.

I know the Brits were terrible to us and the world in general and I should hate them, but oh the language! Just the way they talk is the most fascinating thing ever. The clothes (especially the menswear) and the curtsying and the music and the balls! I love it all. The way Austen romanticised it all, while subtly commenting on the socio economic conditions of the time, is simply ingenious. Mostly because I choose to ignore the socio-economic angle and simply swoon over Captain Wentworth and his devotion to Anne Elliot.

It's safe to say that Jane Austen ruined any other books of that era for me. I simply could not, did not, want to get over her idyllic way of writing and making everything end so perfectly. *Jane Eyre* was good but *Wuthering Heights*? Not in a million years could I make myself enjoy that book in spite of its evident literary brilliance.

If you've never read any of her books, I suggest you go get one NOW. You're missing something you don't want to miss. And then we together can carry her legacy forward by turning the whole world into Austen fans. Hail Austen!

UTILITY OF DEVELOPMENT PROGRAMMES—SANYA SEHGAL, 3RD YEAR

India is an agrarian country. From the very beginning, eradication of poverty has been our major concern. But after many years of independence we still find that more than 37% of India's population still lives below the poverty line. Development is in itself a value loaded concept. It is a process, not a level. It is a path to achieve certain goals. For some it is a qualitative and subjective matter, for others a moral and evaluative one.

Every year we hear a lot regarding development programs being launched in the country aiming for the betterment and welfare of the poor, but are these particularly meant for the poor? Are they actually helping them?

India, a wide and diverse country where innumerable politicians, governmental and non-governmental organizations stand on the dais and promise to take India towards a better future by eliminating poverty and fulfilling the demands of the destitute. But the question arises is how successful are they in doing so? They just toy with the innocent minds of the public. It is true that we do not know everything under the sun. Although a large amount of monetary resources are sanctioned each year, but unfortunately it is only 15-17% of the development projects that have a trickle-down effect. The remaining 83-85% is usually goes into the pockets of dishonest bureaucrats and politicians.

This is the tragedy of the development programs in a developing country like ours. I am pretty sure you all must have heard about the well-known development programs, PDS (Public distribution system). It was meant to provide subsidized food grains and other essential commodities to the poor people in both rural and urban areas. But did it really help?? Where 60% of the beneficiaries of this development program are not the REAL Poor, where most of the time PDS outlets are closed and where the private dealers often resort to many types of malpractices, causing tremendous alterations in the PDS. Seeing this scenario, would you call THIS DEVELOPMENT FOR THE POOR????

Look up at another program, IRDP (Integrated Rural Development Program) which aimed at providing loans to the people in need. Here most of the beneficiaries misused the program resources, many deliberately swindled the money and others who really aspired to benefit from it couldn't do so due to a variety of reasons, including inadequacy of funding, lack of proper training and non-availability of infrastructural support.

The list doesn't end up here my fellow friends, it goes on. Other development programmes like FFW, CMEY, SHG or DEEPAN scheme which was supposed to provide gas to a particular section of society etc. were launched successfully but what they actually set to do was nowhere achieved.

In the end I would just like to conclude that; If this is the Development full of loopholes that our government pledge to the poor then we should stop right here and do something that will really help them.

In the words of Herbert Clark Hoover,

"We have not reached the goal yet, but we shall soon, with the help of God, be in sight of the day when poverty shall be banished from the nation."

A CERTAIN AMBIGUITY : BOOK REVIEW—AKANKSHA MITTAL, 3RD YEAR

It has been a long time since "The Fountainhead" that I came across a novel so satisfying as "A Certain Ambiguity: A Mathematical Novel" by Gaurav Suri and Harosh Singh. Certainly not two of the known strata of intellectual authors that I have tried to read over the past year, kudos to them for the book! Now the book does not boast about a great vocabulary or the use of satirical statements that make you smirk at the wit of the author. Neither does it transport you to a magical land. It talks about two things: Mathematics and Philosophy. Or rather one, Mathematical Philosophy. The book has two subplots, one being the narrator's story and the other being the story of the narrator's grandfather's arrest when he came to America as a mathematics student. Both the stories run parallel to one another and get interspersed with each other at the end. Each one complimenting the other. The story is simple, without any romantic drama that often accompanies a novel. A grandchild follows into the footsteps of his mathematician grandfather, goes on to study at an American university and realizes that he has a lot of finding out to do about his grandfather and himself. Where is the math?

I say, everywhere.

Did you know there are other geometries apart from the "Euclidian Geometry" which are co-existent with the Euclidian Geometry? Did you know that a simply stated problem as that of the Continuum Hypothesis has led to the formulation of a set theory co-existent with the one that we read about? Did you know it is actually possible to just read the proof of a theorem in laymen's terms and be able to understand it without the help of any mathematical symbols? And, most importantly, did you know that the Axiomatic Approach of mathematics is just one of the many schools of mathematics that have been adopted by philosophers like Spinoza?

Well, pardon me for being a little too obnoxious and putting up the above mentioned things as discoveries of higher order when in fact they have been there for a long time! It's just that I chanced upon them through this book and I am glad I did! The main theme of the book which is established at a leisurely pace and dealt with quite mathematically is the concept of absolute truth or "certainty". Now, for someone who often finds herself confused about what is real and what is not, having the characters of the book as accomplices was quite a consolation!

So, summing it up, there are three main elements to the book that I liked: the variety of introductory mathematical theorems supplemented with easy to understand proofs, the fictitious journal entries by famous mathematicians obviously based on a lot of research about their ways of thinking and the intertwined philosophical aspect of God, faith and truth. Though the main theme of the book makes for another blog post in the near future, here is what I suggest to all mathematics enthusiasts: Read it! In fact, all those looking for a stimulating book reading experience: Read it!

LESSONS LEARNT FROM YODA —SURABHI KHANNA, 3RD YEAR

I'm not a serious star wars junkie, by that I mean I'm not one of the guys on the Big Bang Theory, but I definitely think it is one of the coolest movie sagas of all time (at least the old ones are.) It has as much to offer to the average person as it does to your usual geek.

For those of you who aren't familiar with him (Yes, I am judging you a little a bit but not enough to have you banished), here is a little background information. Yoda is a Jedi master in the star wars universe. The Jedi are individuals who promote justice and harmony in the universe with the help of their knowledge of the force. On the other hand, the Sith refer to individuals who use the dark side of the force to further their own agenda. Got me so far?

The Jedi, and by extension Yoda, believe that the most important thing for any individual to do is to carry out their duty that is to fulfill their higher purpose. The message stated here is not so different from the one stated by lord Krishna in the Gita when he asks Arjun to free himself from any emotion that he feels and carry out the task at hand. I know what you're thinking; feeling bad about killing your cousins isn't what I'd peg as the wrong thing to do. Well, that is one of the answers Star Wars can provide as Yoda says "Death is a natural part of life. Rejoice for those around you who transform into the Force. Mourn them do not. Miss them do not." That oughtta convince Arjun. It doesn't convince you does it? Well I hope this does then. It is said that when we mourn the loss of someone too deeply then that person's love for us dissuades it from leaving us and it remains trapped here.

I'm pretty certain none of us want to be the person responsible for that. In such a time wipe away your tear and say "there is no emotion, only peace". That's exactly what this action will bring. (note to those who don't believe in souls: Go to the library and issue a Brian Weiss book.)

Another one of Yoda's lessons is "Once you start down the dark path, forever will it dominate your destiny". The dark side here could represent anything. From anxiety, fear, aggression to substance abuse. Initially providing us fuel, making us feel we are in control and have all this power they ultimately lead to ruin. Think about the time you felt so angry that you allowed rage to fill you up and had throw something (hopefully not a punch) to let it go. Did you feel powerful? How about the time you felt so jealous of what's her name that you decided you absolutely had to show her up the next time round. Did that make you feel like you could accomplish anything? I see you are beginning to see the dangers I was referring to. Someone once said that negative motivation always works better than positive motivation. That's no accident. It is so because the dark side of the force is far stronger. I know what you're thinking. Why not go all dark side then? Well that's something you should ask Anakin Skyw... Oops, Lord Vader. So the next time you allow yourself to get aggressive

take a step back and think that one day you may not have a choice in the matter.

Okay that was pretty intense. Let's talk about something a little more positive now. We all have moments where we let the dark side get to us but the important thing is to realize we are wrong. If you have any problem the first step to solving it is admitting it's there. Don't be afraid to say you are afraid. As master Yoda says "Named must your fear be before banish it you can." And believe you can or else you have already set yourself up for failure. If you still feel afraid whisper these lines to yourself "Fear is the path to the dark side. Fear leads to anger. Anger leads to hate. Hate leads to suffering."

I hope you do decide to make Master Yoda's teachings a part of your life. Don't just try. As master Yoda says, "Do or do not... there is no try." Remember that sooner or later we all have to go out into the real world (sooner for some of us) armed with "only what we take with us". Choose what you take to be 'knowledge' not 'ignorance'. May the Force be with you.

KIRAN - ARADHANA NARANG, 3RD YEAR

Darr hai, Mein manti hun
Dard hai, Mein janti hun.

Khushi ki lehar dur kahin hai,
Ansoon chalke yahin kahin hain,
Suraj ki tapan hai,
Raat ki chaya kahin nahi hai,
Darr hai, Mein manti hun
Dard hai, Mein janti hun.
Ichayon ka jharna hai,
Behta chala jata hai,
Roko bhi toh rok na pao,
Kehta chala jata hai,

Kya mera koi vajud nahi hai?
Ghutan ka ehsaas hai,
Mann mein uthal puthal machi hai,
Shanti kahin nhi hai,

Darr hai, Mein manti hun
Dard hai, Mein janti hun.

Sab sehkar muk-banana mujhe bhata nahi,
Darr se ladne ki koshish bhi hai,
Dard mein bhi hasne ka prayas hai,
Ansoon humne ponch liye hain,

Darr hai, Mein manti hun
Dard hai, Mein janti hun.

Par vishwas hai, Prayas hai
Khushi ki Kiran bhi dhikegi

REALITY AND HOPE - UPASANA GABA, 3RD YEAR

Here I am once again
I am walking down the same road
I see the same faces, the same old place
And I am left wishing for more.
I feel like I was born for another destiny,
This broken life is not for me.
But don't we all feel this way?
We are more than we are allowed to be.
Do those new places hold promise?
Who could tell before leaving!
But as I move on I wonder
Is it a part of me I am forever cleaving?
Life catches us unaware
Always clad in its veils and guises
If we find beauty in the dark nights
That would give the actual pride.

TO BE OR NOT TO BE - GAURANGNA MADAN, 3RD YEAR

Palms all sweaty, breath caught up, heart thumping like the beats of a new Honey Singh song, every nerve tingling with anticipation...all physical responses reach a climax in that impatient wait for the moment when you are simply blown away. And when van Persie does slot the ball past the keeper for (hopefully) the first of many Arsenal goals of the night, the stands erupt in joy. As do I, witnessing record books being filled in, sitting thousands of kilometers away, in a place that's dying to grow into a city. Gurgaon really isn't a credit to its inhabitants, who actually need not much credit. But I diverge. What I wish to talk about is what it means to be a supporter. Of any game, any sport, be it one that involves a ball, a bat, a bow, an arrow...anything that moves (not Shakira's booty I'm afraid, but then again, that too has a bunch of takers).

First off, let me lay down a few ground rules. Rather notations, as RJ Ma'am, will succinctly put it in any complex class. When I talk about a team, it encompasses everything from a football club such as mine (to make clear to those who haven't picked up on my leanings—I live and breathe Arsenal Football Club), a cricketing nation, a tennis sensation, a golf-pro, a beach volleyball duo, a hockey hero, a kabaddi-well not so much zero. Next, a supporter may be a man, a woman, a child, a dog (I swear Theo loves Arsenal too) or any other living creature that lives for the team. Finally, we will move along with the understanding that this piece deals with supporters and not fans, the difference being a glaring one.

To put it sweetly, fan is short for fancy. Anybody who wakes up one morning and develops a 'liking' for a particular team, usually motivated by superficial factors comes in the category of a fan. A fan will be someone who will 'like' one team on one day and switch loyalties the next, noting here that the word loyalties has been used in the loosest sense. A supporter on the other hand, is a person who lives and breathes for the team. Much like a bijective function, he shares a one-to-one correspondence with his team. A fan is like a many-to-one function, with no great loyalties, branching out into a number of points. And of not much use, because why in the world will we want to study the properties of somebody who has not much to offer in terms of uniqueness and identities? And I'm not saying that a fan cannot turn into a supporter, it's a rare occurrence—you have to restrict the domain of $f(x) = x^2$ to make sure it's one-one. Similarly, a fan will have to grow out of his 'flighty' tendencies and develop certain characteristics to qualify as a supporter.

The motivations for being a supporter constitute mainly of (a) genetic predisposition (more to do with the family's history of support than chromosomal activity); (b) admiration for the way the team plays (here the individual tends to be a purist and is a supporter of the 'purity' of the sport that the team maintains); (c) location (read-national teams); and (d) love for a single player that later blooms into a full-blown romance with the team. The common thread that links all these factors is the belief that the person in question was born to be a supporter. Whatever the impetus, the person is bound for life. It's like your genes - you really can't help yourself.

One of the main characteristics that we find in a supporter is the ever-optimistic, never-say-die attitude. It isn't over till the ball has left the field is an oft-heard statement in his camp. Four goals down, or nine wickets down, the number doesn't bother him much—as long as there is time on the clock he believes that if not a miracle then some sort of revival can happen. Worst, the margin of loss can be minimized.

The level of loyalty in a supporter too is one of his great traits. The roughest of times and the worst of patches see a supporter standing as tall by his team as when they were sweeping the record books away. This is because he knows that the ball has to go up sooner or later, and that good times will always follow. A life lesson that in my belief everyone should learn. The off-season finds your supporter in the glummiest of states. Not only does he have to put up with reruns of obscure films on HBO, but worse of all he finds himself sucked into the social world with topics of discussion revolving around inanities like the weather and the reruns of obscure films on HBO. The only thing he can contend himself with are the mutual feelings of anguish of supporters worldwide whose entire existence has been thrown into disarray during those awful months of no games.

And just when he thinks he can take it no more, he regains a bit of balance at the pre-pre-season talks by the players and coaches. There is a bit of color in his face when the news of the pre-season warm-up is announced. He begins to see order in the chaos when the fixture list of the pre-season friendlies comes in, he begins to see light in the world when the players resume training full-time. He skips for joy when the countdown on his calendar to the first game of the season reaches a month, a week, and finally, a day.

Head bowed in respect, the supporter sees normalcy return. Life makes sense to him again. Everything in its right place.

THE JESTER

MATHOSCOPE —ANISHA BANERJEE , 3RD YEAR

ARIES: Your stars reflect a sense of accomplishment and superiority in you. However you must understand that solving your younger sibling's elementary Math problems isn't the best way to evaluate yourself. It's okay, don't get discouraged Math has a way of making us delusional.

TAURUS: Keep a check on your aggressive self. You might spot a Cauchy lookalike on the streets. Avoid strangling him in public. Remember he's not real.

GEMINI: Your nerdy attributes seem to grab a lot of attention in class. Someone seems to be 'tending' towards your hyperactive self. Look to Hindu Mythology for answers.

CANCER: Get your books bound as soon as possible. There are chances you'll end up with a pool of drool over your study material during revision.

LEO: Stars indicate that hair fall is to be your latest worry. Take care of your mane or it'll become a function of a dramatically increasing sequence!

VIRGO: Your concepts in Math are sound. What you need is handwriting practice. Most people have trouble deciphering what you've written. Even Indian intelligence agencies have been working on it.

LIBRA: Keep a check on your eating habits. Piled up projects and assignments have quadrupled your hunger pangs. Continue to binge if you can afford a new wardrobe.

SCORPIO: Frustration is on the cards since you'll face difficulty cracking the latest sudoku puzzle. Keep calm! Ask the kid next door for help.

SAGGITARIUS: Your creativity is soaring to new heights. However beware of prying eyes! Your professor might catch you doodling in her lecture.

CAPRICORN: Gulp down a cup of coffee every morning for a couple of days as snoring loudly in class is indicated. The situation is expected to worsen, expect a Youtube video of you sleeping in class with your mouth open.

AQUARIUS: Your mind has been extra quick and bright lately. But don't over use it. Mental tiredness in the bathroom might lead to painful injuries.

PISCES: Mental turmoil is indicated. Dreaming of Algebra is bound to leave you feeling drained.

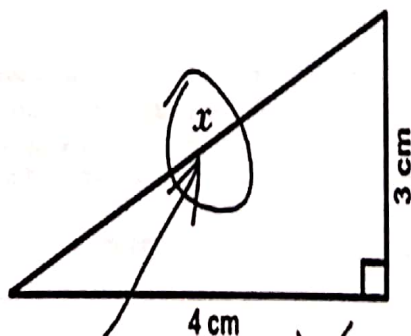
Solving equation by one Blondie:

$$\frac{1}{n} \sin x = ?$$

$$\frac{1}{n} \sin x =$$

$$\text{six} = 6$$

3. Find x.



Here it is X O

After explaining to a student through various lessons and examples that:

$$\lim_{x \rightarrow 8} \frac{1}{x-8} = \infty$$

I tried to check if she really understood that, so I gave her a different example. This was the result:

$$\lim_{x \rightarrow 5} \frac{1}{x-5} = \infty$$

Proof that girls are evil:

First we state that girls require time and money.

$$\text{Girls} = \text{Time} \times \text{Money}$$

And as we all know "time is money."

$$\text{Time} = \text{Money}$$

Therefore:

$$\text{Girls} = \text{Money} \times \text{Money} = (\text{Money})^2$$

And because "money is the root of all evil":

$$\text{Money} = \sqrt{\text{Evil}}$$

Therefore:

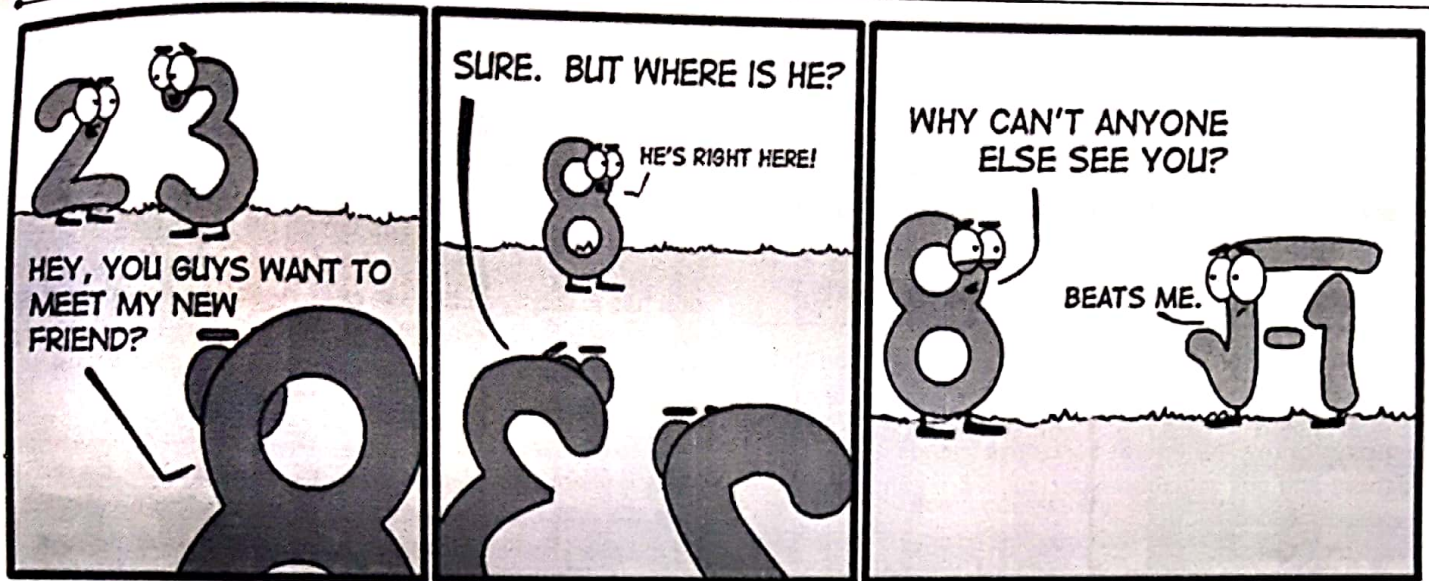
$$\text{Girls} = (\sqrt{\text{Evil}})^2$$

And we are forced to conclude that:

$$\text{Girls} = \text{Evil}$$

Jokes and Pictures contributed by:
Saakshi Arya
and
Rhea Palak Bakshi

THE JESTER



- There is a shipwreck and the only three survivors are a Doctor, a Lawyer and a Mathematician, in a rowboat.

After some time drifting about the seas, eventually they get to talking and get to know each other. One day the doctor asks, "Is it better to have a wife or a girlfriend? I would say it's better to have a wife. I work long hard and emotional hours, and it's really great to have a caring wife who cooks great meals, cleans my clothes, and expertly manages our home and children."

The lawyer says, "I think it's better to have a girlfriend. I'm a Divorce Lawyer and the cost to the man in Divorce is so extreme I don't see where having a wife is worth the risk."

The mathematician says, "I think it's better to have both."

"What !?" say the doctor and lawyer. "Why?"

"Because," the mathematician says, "You can tell your wife you're working late, and your girlfriend you need to spend time with your family, which gives you more time to work on proving the Riemann Hypothesis !"

- Let epsilon be less than zero... *Not really a joke, but rather a mathematician detection device: Tell it at a party, and those who laugh must be mathematician.*
A newlywed husband is discouraged by his wife's obsession with mathematics. Afraid of being second fiddle to her profession, he finally confronts her: "Do you love math more than me?"
"Of course not, dear - I love you much more!"
Happy, although sceptical, he challenges her: "Well, then prove it!"
Pondering a bit, she responds: "Ok... Let epsilon be greater than zero..."
- Q: Why do you rarely find mathematicians spending time at the beach?
A: Because they have sine and cosine to get a tan and don't need the sun!

MIXTAPE

Take a trip down memory lane with some of our third years who shared their experience and at LSR, and with the Math Department .

I never thought of being in LSR. Or doing math honours. But I can surely say that these three years have been the best days of my life. I meet awesome friends, wonderful teachers and got valuable experience. I'm gonna miss LSR (especially room 61!).

-Manushi Gupta

LSR is the craziest place on Earth! Speaking about my stay here, the dictionary is yet to find a word that can describe the blend of fun, 'enthu', tears, work, laughter, stress, love, lawns, gazebos, audi, café, cats, friends and teachers. LSR has been an amazing experience and I'm gonna miss this place hard! **-Surbhi**

These 3 years were the best days of my life. I met amazing people and my friends who were always there to help out in any situation. I'm really going to miss my class. **-Shefali**

LSR is the place where I got to meet all these amazingly smart girls each having a quality all their own. The Dance society helped me grow as a dancer and as a person as well. The Math dept. is a small family and each member makes it the best dept. with their love and support. Our teachers put in a tremendous amount of effort just so that we can do well in life. I want to thank my friends for being with me on this journey. Will miss all of you. **-Shreya Aggarwal.**

The place where life took a sharp turn...as safe as home...LSR. It gave wonderful friends and the best teachers. Time flew sitting in room 27, 14 and 61. Coming here was the best thing that ever happened to me. **-Upasna Gaba**

More than memories in LSR there are memories in room 14 and room 61! Nothing would have been so beautiful had it not been for our class. Teachers say we are awesome... and we are. I'll miss

Our class more than anything because 'we are family'. **-Ruhi Gupta**

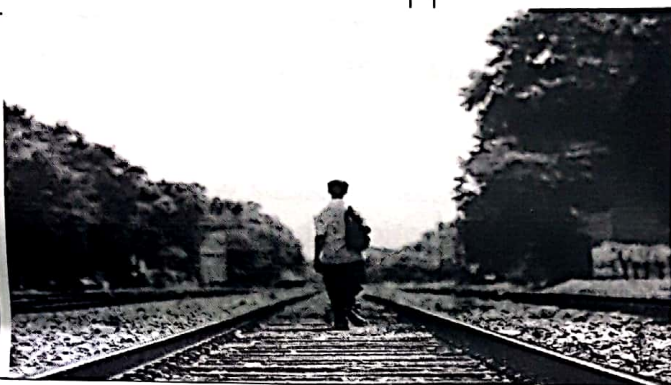
LSR is like a school, But I love this school!! It has given me the opportunity to explore myself and to be much more confident than ever before. In spite of the long working days, the teachers of the mathematics dept. have kept such a spirit of mathematics that I love my subject of study. I'm a busy girl now after coming to LSR. I love my class, teachers and college. The magic of LSR is amazing! **-Aradhana Narang**

The 3 years which I spent at LSR were surely the best days of my life. Such a wonderful class where I met the best people ever, such awesome friends and wonderful teachers. Will really miss this place and will cherish the memories here throughout. **-Neelima Yadav**

Three years just passed by like a dream. Lady Shri Ram College provided a great place for grooming self, making friends for a lifetime and enjoying each and every moment of being in a girls' college. Each and every memory will be cherished for the life. The college, the math dept. mark a remarkable memory for the coming life. **-Divya Patnaik**

Three years in Math (H) with the new syllabus, chaotic Semester system and with really really crazy classmates.

And now I am one of the craziest. Adorable teachers Who tolerated our most absurd thoughts and ideas. Now when it is time to go it seems it was only yesterday when I met the "jokers" of my class, time just flew away with you guys and now I have only one thing to say to you "Meri hansi ko apni yaadon mein hamesha tazaa rakhna..." **-Meghna Goswami**



I had the time of my life here in LSR. From early morning volleyball practice, to sitting in class (room 61) till 5 o'clock. Everything has just been so amazing. I couldn't

have asked for a better experience here (Especially my second year). **-Neha**

I've spent the last 3 years in class with 25 girls. And since we have a lot of those (when I say a lot I mean a lot) , I've gotten to know them quite well. So, I'd like you to know some of the things that make them special and hope you get the chance to know them the way I do. Or at least they get to see themselves the way I and (no doubt about it) the world sees them.

Sakshi: You are ever smiling and happy. So helpful and full of joy. I don't think there is anybody in this world who cannot like you.

Krishma: You're so smart and cheerful; you'll make a wonderful teacher. You are probably the most carefree topper I've ever met.

Gaurangna: You are the cutest. I've learnt so much from you. Dedicated and sincere. The only one I can discuss 'the meaning of life' with. You're at a different plane altogether. I love you.

Shelfali: You're so cool and bindass. I'm sure we'll meet at many air force parties. *wink*.

Sanya: You are definitely the 'never say no' girl. Department, Prakriti, Entretia, all the work in this world you do and never ever have I heard an uff! Come out of your mouth. Just amazing.

Apurva: Chikki chikki tera pyar chahiye da! You're like this pocketful of sunshine. So chilled in life, absolutely sorted and mature.

Meghna Goswami: My namesake and the foodie of our class (not that I've the right to say that :)). The baby of our class, sweetest ever.

Gayatri: Whatever said and done, you're the naughtiest in the class. The only reason classes never get dull.

Himanshi: You're like the babe of our class. So relaxed and carefree. I enjoy the way you live life on your own terms.

Aradhna: Sincerity personified. Throughout all these years I've always admired your hard work and intelligence. And then of course there is the cuteness and what would we all ever do without your notes.

Aparna: You deserve the title of dabangg. Very bold (you cut you extremely nice long hair so short!!!). You are a person who I feel doesn't get bothered so easily, no matter what I've always seen a smile on your face.

Ruhi: You're the most considerate, smart and people's President our department could've had. Thank you for always taking along all of us together.

Surabhi Khanna: You're truly a superwoman. You just know about everything, I mean it seriously!!! It is just brilliant how your brain works. Definitely one of the smartest and most caring people I've ever met. I love you.

Surbhi Arora: You're totally chupa rustam,. how much ever quiet she may seem, as much naughty and full of pranks she is. One of those few who truly understand mathematics.

Anisha: You are the loveliest in all ways. I don't think there is any negativity in you. You're like this bright, loving, energetic person with innumerable talents.

Neelima: My early morning partner. I just cannot imagine the amount of patience you have. You listen to everybody, with utmost care and sincerity. Almost three years and never have you said a bad word about anybody. The nicest person.

Manushi: You're the hero of our class. Every nice adjective in this world is suited to you. You're a wonderful CR and even more wonderful a person. You have no idea how much your work is appreciated. Thank you for everything that you've done.

Upasna: you're sweet and ever helpful. Totally mast and fun loving. Always laughing and unlike most of us, you actually live a college life. So chilled.

Abhishri: This is to tell you that you are smart, pretty, kind, and little crazy with a very strong character. I learn so much from you everyday. I know you'll make this world a better place to live in. I love you.

Prashansa: A silent worker there, but you're probably one of those who are actually 'Studying' mathematics for all that it deserves.

Shreya: I don't know how to identify you with a Capricorn, you are like a Libran. They are the prettiest and strike a perfect balance in life. Just the way you do.

Sweet, helpful, caring, fun-loving and responsible. And so I can justify my next lines without sounding weird at all. If I were a boy, I'd marry you. I love you.

Preeti: You're this compliment giving machine. It's like you only say nice stuff. You always make people smile. Just so that you know, you're terrific!

Neha: You're the stud of the class. Bindass and no-nonsense girl. Thank you for all the free coupons you give and also the yummy tiffin. You should know that in me lies your true well-wisher *pats her stomach*

PS: I love your fav song too, "isharon isharon me".

Priya: Without any intent of sounding creepy, you're very attractive and charming. I simply love how you're so chilled out in life.

Divya: Very very sweet, the cutest and the girl with most innocent smile. You are a person with such purity of heart that it shines through your face.

NOTE : Meghna Goyal is the warmest person I know. She is unfailingly kind ,as those who've had a lot of maybe undeserved praise directed towards us above (myself included) know well enough. Fun beyond compare and a little mad (don't you dare deny it), you're special,. Only a fool would disagree.