

# Quantum 2011

## THE MATHEMATICAL GAZETTE

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### *FROM THE EDITOR'S DESK.....*

Medals and Scams. Corruption and Controversy. Violence and Inflation!!!

In a year when so much made the news, what will the people remember 2010 for. Every year is a mixed bag, but 2010 makes for a welcome and revealing contrast to recent times. It seemed like 2010 was overflowing with "you've got to be kidding me!" moments. It all started with the FIFA world cup, where no one could have predicted that an undersea creature (PAUL, the octopus) would be among the most canny prognosticators of World Cup outcomes. Then again, perhaps it stands to reason that a sport so focussed on leg agility should earn the close attention of an eight legged animal. Then after a long wait, came the much debated and historic Ayodhya Verdict that dawned a new hope of a united and peaceful future amongst the Hindus and Muslims. The release of Aung San Suu Kyi was yet another momentous event, not only for the Burmese, but for the women all over the world inspiring them to look within for value and look beyond for perspective!!! National Pride was also at play in the world of sports, when India successfully hosted the nineteenth Commonwealth Games amidst the mismanagement and corruption. On a darker side, the nation unveiled some of the ugliest scams ever like the 2G scam and the Swiss Bank money laundering reflecting the moral degeneration of the people.

Nat King Cole famously sang: "Unforgettable, that's what you are.....". But wise men say, life's a book of laughter and forgetting. One chapter-2010-finished, let painful memories escape the brain's loft, like incriminating evidence did from official safekeeping in the year of the scam gone by.

At the risk of sounding like Miss Universe, over the new decade, let's invest in our moral well being even as India prospers economically!! Let's make a promise to pray for the sanity, dignity, happiness, safety and welfare of every human being of every religion, nationality, race and gender. Let's promise to be less judgemental and more tolerant. Let's also make a simple effort to be happy.

As a part of the Batch of 2011, I would like to take a moment to thank every member of the faculty, on behalf of all twenty seven of us. We have not just learned the subject, we have enjoyed it. We have also imbibed good values and in the words of Edward de Bono, "extended our cope space." 'Thank you' is not enough. Despite all the cribbing about attendance, class timings and assignments, we are forced to acknowledge that LSR rocks! We were good together, despite our substantial idiosyncrasies!! We all wish our juniors luck and success in their future endeavours.

Read on to find out what the year has been like for the Department of Mathematics of LSR. Any suggestions and contributions will be welcome. Do write to us with your thoughts at - [maths.lsr@gmail.com](mailto:maths.lsr@gmail.com). The Team Quantum would also like to extend their heartfelt thanks to the faculty for their continued support and encouragement towards the newsletter.

So, Here's hoping you enjoy flipping through every page, as much as we've enjoyed making every page come to life!

Tanisha Manaw

## NATIONAL SEMINAR

TANISHA MANAW

The Department of Mathematics strives to explore various aspects of Mathematics, permeate critical thinking amongst the students and provide opportunity to explore intelligence, talents and understanding. In this regard, the department organized a National Seminar on "Differential Equations and Mathematical Modeling" on 23rd and 24th of September, 2010. This seminar witnessed the presence of eminent Mathematicians like **Professor Kadalbajoo**, Department of Mathematics and Statistics, IIT Kanpur, **Professor Karmeshu**, School of Computers and Systems, Jawaharlal Nehru University, New Delhi, **Professor Girija Jayaraman**, Centre of Atmospheric Sciences, IIT Delhi, **Dr. Shobha Bagai**, Department of Mathematics, Shyama Prasad Mukherji College for Women, University of Delhi, **Professor Sandip Bannerjee**, Department of Mathematics, IIT Roorkee. Their lectures were chaired by Professor R.K. Mohanty from the Department of Mathematics of the University of Delhi; Professor Pankaj Jain from the Department of Mathematics of Deshbandhu College, University of Delhi; Dr. Asha Mathur, Mathematician and ex-vice principal of Lady Shri Ram College, University of Delhi. The highlight of the event was the Debate Competition to showcase the debating prowess of the students where teams from various colleges put forth their views on the topic of the house: **Zero better than one**. It was very interesting to listen to the metaphorical relations of zero and one in the real world. The team from Amity Institute of Technology, Noida was adjudged as the Best Team and Gayatri Sikka from LSR won the Best Speaker award. This was followed by 'Click-O-Maths', the photography competition where the participants tried to capture their interpretation of the theme 'Mathematical Vistas'. Overall, the seminar was a success, thanks to the effort of the students and the faculty of the department. Having witnessed an enthusiastic response from students of various colleges, it set an example and encouraged the members of the department to try and raise the level up a notch next year.

## TALKATHONS:

### •“TRANSITION FROM SCHOOL TO COLLEGE”

The Department also organized a talk by **Professor and Pro-Vice chancellor Parvin Sinclair** from the Indira Gandhi National Open University, on the 28th of July, 2010. on 'Transition from School to College' keeping in mind the first year students .

### •WORKSHOP ON RESEARCH METHODOLOGY

A lecture on research methodology was conducted by 'Prof. Ajay Kumar' on "in the Mathematics department. Research methodology is the analysis of the principles, rules, postulates employed by a discipline during research. The system of collecting data for research projects is known as Research Methodology.

It was an enriching experience to know how to go about on research and gave all the students as well as teachers a clear insight into research methodology. Prof. Ajay also gave a short lecture on 'Fourier series'. The lecture was followed by a question answer session in which students asked their doubts regarding research work, which all the more made the concept of research clearer. All over it was a learning and inspirational experience and the students got to learn a lot from the workshop.

### •MBA PREPARATION SIMPLIFIED

To keep up with the trend of inspiring the students towards widening their horizon apart from mathematics, a talk by **Mr. Kapil Verma** from the institute of T.I.M.E. was held. He gave the MBA aspirants the knowledge on Group Discussions and Personal Interviews.

## ANUPAMA DUA PAPER PRESENTATION AND SCHOLARSHIP FUNCTION

The Anupama Dua Scholarship Function holds a very special place in the annual calendar of the department of Mathematics because this is the day we celebrate the spirit of a very special human being-Anupama Dua.

Anupama was a brilliant student, a gifted mathematician, and a loyal friend. The function is a tribute to her. We celebrate her inherent quest for pushing the boundaries of her mathematical knowledge by presenting papers on a vast array of mathematical concepts, which extend beyond the limits of our curriculum. The 17th Annual Anupama Dua function held on 11th of January 2011 was very special. The day started on a somber note, with the department observing a minute's silence for the departed soul. The teachers then, shared their memories of Anupama, the student. Thereafter, Mrs. and Mr. Dua gave away the scholarship instituted by them in their daughter's memory. The recipients of this year's scholarship were **Payal Bedi (Ilyear)**, **Kirat Dhillon (Ilyear)** and **Krishma(I year)**, **Aradhana Narang(I year)**. As always, Dr. Gopinath's speech was inspirational. She spoke about the importance of mathematics, the progress of the mathematics department and the spirituality associated with the occasion. The presentations that followed covered topics as varied as Mathematics and Music to Stochastic differential Equations and Continued Fractions, cryptography, computer graphics and linear algebra, markov chains, prime numbers, and many more. The emotional climax of the day was however, the nurturing of the tree planted in LSR in memory of Anupama. It was indeed a poignant moment as the bereaved parents watered the, now in bloom, bottle brush tree.

## WORKSHOPS/CERTIFICATE COURSE:

•Keeping in view of the importance of technology in the future, the Department of Mathematics in collaboration with the Department of Bachelor of Elementary Education organized a 8 week **certificate course on 'Modeling with Spreadsheets'** with **Dr. Jonaki B. Ghosh**, Department of Elementary Education, Lady Shri Ram College as the resource person.

•A **workshop on "LaTeX"** which is a high-quality typesetting system mandatory for writing research papers and these days has also become an admission criteria in various reputed institutions, was organized for the students of the Mathematics Department in order to make them proficient in Mathematical typing. It was conducted by the alumnae of the Department: Dootika Vats, Rangoli Jain and Ilika Mohan. It was indeed a very enriching experience for each one of us, thereby helping us to write our papers in the journal with much more ease.

## THE FRESHERS' PARTY 2010

**ERA CHOUDHARY**

The most awaited freshers' party finally took place on the 20<sup>th</sup> of August with the theme "PROM NIGHT". The 1<sup>st</sup> years looked beautiful and were extremely enthusiastic about dressing up for the party! It was thoroughly enjoyed by all the students as well as the faculty members. We began with a dazzling dance performance given by the 2<sup>nd</sup> years and the 'juniors' introducing them. Then was a song sung by our very talented 1<sup>st</sup> years followed by a spoof done by the 2<sup>nd</sup> years. It was enjoyed by all and received a lot of appreciation. Then was a song sung by our very talented 1<sup>st</sup> years followed by a spoof done by the 2<sup>nd</sup> years. It was enjoyed by all and received a lot of appreciation.

A few freshers were selected for the personality contest and were asked some very innovative questions on the basis of which some were selected for the next round. Finally we got our Miss 'Best Dressed' and Miss 'Fresher'.

Of our extremely enthusiastic faculty members, Mahesh Sir sang a beautiful song followed by our Head of the Department, Monica Ma'am.

Towards the end, food was served which everyone enjoyed and relished.

## A MUCH NEEDED BREAK FROM MATHS!!!

**SAKSHI ARYA**

A day trip was organized by the Mathematics Department on 5<sup>th</sup> February 2011. The itinerary was planned for Akshardham Temple and Hauz Khas Ruins. The trip began at 9 in the morning with everyone geared up for the upcoming outing and fun. The bus travel was the best start to the trip. We played antakshari on the way with teachers equally participating. We then reached Akshardham Temple at around 10:30a.m. After depositing all the cameras and mobile phones we headed inside the Divine atmosphere. We had a chance to travel in the mesmerizing boat ride which left everyone awestruck. This was followed by an enriching and motivating movie about the life of the Narayan Guru. And lastly we went to the peaceful atmosphere of the temple. After filling our hungry stomachs to the fullest we left the temple happy and contented with doubled enthusiasm.

We then headed towards the fort in HauzKhas Ruins. The hunt for the way down to the lake and the jump that followed is unforgettable. We had refreshments in the park and played all sorts of fun games... a new wave of zeal and fervour ran through all of us. To quote some of the students, "I got to see a different side of people I have known for an year but without any kind of inhibition, completely free..." with teachers around us singing and dancing was a big treat and an altogether different aspect of them..." all and out the trip was filled with pleasant memories which shall be cherished by us forever.

## SNAPSHOTS :



# OUR DAILY BREAD : OF MATHS AND MATHEMATICIANS

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## RUSSELL'S PARADOX

SALONI JAIN

Let me tell you a famous story:

There was once a barber. Some say that he lived in Seville. Wherever he lived, all of the men in this town either shaved themselves or were shaved by the barber. And the barber only shaved the men who did not shave themselves.

That is a nice story. But it raises the question: **Did the barber shave himself?** Let's say that he did shave himself. But we see from the story that he shaved only the men in town who did not shave themselves. Therefore, he did not shave himself. But we again see in the story that every man in town either shaved himself or was shaved by the barber. So he did shave himself. We have a contradiction. What does that mean? Maybe it means that the barber lived outside of town. That would be a loophole, except that the story says that he did live in the town, maybe in Seville. Maybe it means that the barber was a woman. Another loophole, except that the story calls the barber "he." So that doesn't work. Maybe there were men who neither shaved themselves nor were shaved by the barber. Nope, the story says, "All of the men in this town either shaved themselves or were shaved by the barber." Maybe there were men who shaved themselves **AND** were shaved by the barber. After all, "either ... or" is a little ambiguous. But the story goes on to say, "The barber only shaved the men who did not shave themselves." So that doesn't work either. Often, when the above story is told, one of these last two loopholes is left open. So I had to be careful, when I wrote down the story. Now we come to a really serious attempt to solve the above puzzle: Maybe there was no barber like the one described in the story. But the story said, "There was once a barber..." So there really was a barber like that.

Consider another example: A language has several adjectives. Let us consider English. Some of the adjectives in the language are self descriptive, adjectives that describe themselves, for example, pent syllabic since it has, as its meaning suggests, five syllables, and, awkwardnessful, which really is full of awkwardness. The remaining adjectives, i.e., the adjectives that are not self descriptive, are, obviously, non-self descriptive, i.e., those that do not describe themselves, for example, bisyllabic. If the previous example has not already skewed your brain, you would happily agree with the above sentence, but if it has, you would be a little circumspect in making such assumptions that otherwise seem too trivial and let me say that in that case, you would be wise. Why? Let's consider the adjective "non-self descriptive". Is it self descriptive or non-self descriptive? Let's say it is self descriptive. That means, the adjective "non-self descriptive" applies to itself, which, in other words, indicates that the adjective "non-self descriptive" is non-self descriptive, which is contrary to our assumption that it's self descriptive. If it's not self descriptive, then let's say it's non-self descriptive. But that can't be true since being non-self descriptive would imply that the adjective "non-self descriptive" does not apply to itself, or in other words, it is not non-self descriptive, i.e., it is self descriptive. Once again, we are in the same old infinite loop in which one assumption implies the other and the other implies the first one and hence, once again, we are unable to decide whether the adjective "non-self descriptive" is self descriptive or non-self descriptive.

**The above story about the barber is the popular version of Russell's Paradox. The story was originally told by Bertrand Russell. And of course it has a simple solution. It is inconsistent. But the story is not really that simple. The story is a retelling of a problem in set theory.**

In set theory, we have sets, collections of objects. These objects may be real physical objects (marbles) or not (cartoon characters, thoughts, or numbers). When we deal with a set, we normally write it down with brackets:  $\{A, B, C\}$ . That set contains three letters, A, B, and C. The set  $\{B, C\}$  is a subset of  $\{A, B, C\}$ . There is a special set with no elements, the empty set  $\{\}$  or  $\emptyset$ , as the set of humans bigger than the earth, or the set of odd numbers divisible by two. Some sets contain infinitely many elements, as the set of all even numbers. A set can contain sets. The set  $\{\{A, B, C\}, \{x, y\}\}$  contains two sets  $\{A, B, C\}$  and  $\{x, y\}$ . It also contains the empty set, by the way. All sets contain the empty set. We can define the set of all sets. This set contains  $\{A, B, C\}$  and  $\{\{A, B, C\}, \{x, y\}\}$  and every other possible set. Some sets contain themselves. The set of all red marbles does not contain itself, because it contains no sets at all, only marbles. Let's say that S is a set which contains S and  $\{A, B\}$ . Then this is S:  $\{S, \{A, B\}\}$ . It contains two sets, itself and  $\{A, B\}$ . The set of all sets obviously contains itself. Well, let's construct a very interesting set, **the set of all sets which do not contain themselves**. There is something wrong here. Does "the set of all sets which do not contain themselves" sound like "the barber who shaves all men who do not shave themselves?"

Russell's own response to the paradox was his aptly named *theory of types*. This solution to Russell's paradox is motivated in large part by the so-called *vicious circle principle*, a principle which, in effect, states that no propositional function can be defined prior to specifying the function's range. Various responses to Russell's paradox have helped logicians develop an explicit awareness of the nature of formal systems and of the kinds of metalogical and meta mathematical results commonly associated with them today. Russell's paradox is undoubtedly the most beautiful paradox I have ever seen, and as they claim, it did lead to a major overhauling of mathematics. Because of this, and because set theory underlies all branches of mathematics, many people began to worry that, if set theory was inconsistent, no mathematical proof could be trusted completely.

## THE "BEAUTIFUL MIND" : JOHN NASH

## ABHISHREE AGRAWAL

Johnny Nash, as he was called by his family, was born in Bluefield Sanitarium and baptized into the Episcopal Church. He was a singular little boy, solitary and introverted but he was brought up in a loving family surrounded by close relations who showed him much affection. After a couple of years Johnny had a sister when Martha was born. He seems to have shown a lot of interest in books when he was young but little interest in playing with other children. It was not because of lack of children that Johnny behaved in this way, for Martha and her cousins played the usual childhood games:

cutting patterns out of books, playing hide-and-seek in the attic, playing football. However while the others played together Johnny played by himself with toy airplanes and matchbox cars.

His mother, Margaret Virginia Nash, responded by enthusiastically encouraging Johnny's education, both by seeing that he got good schooling and also by teaching him herself. John Nash Sr., Johnny's father, responded by treating him like an adult, giving him science books when other parents might give their children coloring books.

Johnny's teachers at school certainly did not recognize his genius, and it would appear that he gave them little reason to realize that he had extraordinary talents. They were more conscious of his lack of social skills and, because of this, labeled him as backward. Although it is easy to be wise after the event, it now would appear that he was extremely bored at school. By the time he was about twelve years old he was showing great interest in carrying out scientific experiments in his room at home. It is fairly clear that he learnt more at home than he did at school.

Martha seems to have been a remarkably normal child while Johnny seemed different from other children. She wrote later in life :-

*Johnny was always different. [My parents] knew he was different. And they knew he was bright. He always wanted to do things his way. Mother insisted I do things for him, that I include him in my friendships...but I wasn't too keen on showing off my somewhat odd brother.*

Nash first showed an interest in mathematics when he was about 14 years old. Quite how he came to read E T Bell's *Men of Mathematics* is unclear but certainly this book inspired him. He tried, and succeeded, in proving for himself results due to Fermat which Bell stated in his book. The excitement that Nash found here was in contrast to the mathematics that he studied at school which failed to interest him.

He entered Bluefield College in 1941 and there he took mathematics courses as well as science courses, in particular studying chemistry, which was a favourite topic. He began to show abilities in mathematics, particularly in problem solving, but still with hardly any friends and behaving in a somewhat eccentric manner, this only added to his fellow pupils' view of him as peculiar. He did not consider a career in mathematics at this time, however, which is not surprising since it was an unusual profession. Rather he assumed that he would study electrical engineering and follow his father but he continued to conduct his own chemistry experiments and was involved in making explosives which led to the death of one of his fellow pupils. Boredom and simmering adolescent aggression led him to play pranks, occasionally ones with a nasty edge. He caricatured classmates he disliked with weird cartoons, enjoyed torturing animals, and once tried to get his sister to sit in a chair he had wired up with batteries.

Nash won a scholarship in the George Westinghouse Competition and was accepted by the Carnegie Institute of Technology (now Carnegie-Mellon University) which he entered in June 1945 with the intention of taking a degree in chemical engineering. Soon, however, his growing interest in mathematics had him take courses on tensor calculus and relativity. There he came in contact with John Synge who had recently been appointed as Head of the Mathematics Department and taught the relativity course. Synge and the other mathematics professors quickly recognised Nash's remarkable mathematical talents and persuaded him to become a mathematics specialist. They realised that he had the talent to become a professional mathematician and strongly encouraged him.

Nash quickly aspired to great things in mathematics. He took the William Lowell Putnam Mathematics Competition twice but, although he did well, he did not make the top five. It was a failure in Nash's eyes and one which he took badly. The Putnam Mathematics Competition was not the only thing going badly for Nash. Although his mathematics professors heaped praise on him, his fellow students found him a very strange person. One of his fellow students wrote:-

*He was a country boy, unsophisticated even by our standards. He behaved oddly, playing a single chord on a piano over and over, leaving a melting ice cream cone melting on top of his cast-off clothing, walking on his roommate's sleeping body to turn off the light.*

And a third fellow student wrote:-

*We tormented poor John. We were very unkind. We were obnoxious. We sensed he had a mental problem.*

He showed homosexual tendencies, climbing into bed with the other boys who reacted by making fun of the fact that he was attracted to boys and humiliated him. They played cruel pranks on him and he reacted by asking his fellow students to challenge him with mathematics problems. He ended up doing the homework of many of the students.

Nash received a BA and an MA in mathematics in 1948. By this time he had been accepted into the mathematics programme at Harvard, Princeton, Chicago and Michigan. He felt that Harvard was the leading university and so he wanted to go there, but on the other hand their offer to him was less generous than that of Princeton. Nash felt that Princeton were keen that he went there while he felt that his lack of success in the Putnam Mathematics Competition meant that Harvard were less enthusiastic. He took a while to make his decision, while he was encouraged by Synge and his other professors to accept Princeton. When Lefschetz offered him the most prestigious Fellowship that Princeton had, Nash made his decision to study there.

In September 1948 Nash entered Princeton where he showed an interest in a broad range of pure mathematics: topology, algebraic geometry, game theory and logic were among his interests but he seems to have avoided attending lectures. Usually those who decide not to learn through lectures turn to books but this appears not to be so for Nash, who decided not to learn mathematics "second-hand" but rather to develop topics himself. In many ways this approach was successful for it did contribute to him developing into one of the most original of mathematicians who would attack a problem in a totally novel way.

In 1949, while studying for his doctorate, he wrote a paper which 45 years later was to win a Nobel prize for economics. During this period Nash established the mathematical principles of game theory.

P Ordeshook wrote:-

*The concept of a Nash equilibrium n-tuple is perhaps the most important idea in non-cooperative game theory. ... Whether we are analysing candidates' election strategies, the causes of war, agenda manipulation in legislatures, or the actions of interest groups, predictions about events reduce to a search for and description of equilibria. Put simply, equilibrium strategies are the things that we predict about people.*

Milnor, who was a fellow student, describes Nash during his years at Princeton in :-

*He was always full of mathematical ideas, not only on game theory, but in geometry and topology as well. However, my most vivid memory of this time is of the many games which were played in the common room. I was introduced to Go and Kriegspiel, and also to an ingenious topological game which we called Nash in honor of the inventor.*

In fact the game "Nash" was almost identical to Hex which had been invented independently by Piet Hein in Denmark.

Here are three comments from fellow students:-

*Nash was out of the ordinary. If he was in a room with twenty people, and they were talking, if you asked an observer who struck you as odd it would have been Nash. It was not anything he consciously did. It was his bearing. His aloofness.*

*Nash was totally spooky. He wouldn't look at you. He'd take a lot of time answering a question. If he thought the question was foolish he wouldn't answer at all. He had no effect. It was a mixture of pride and something else. He was so isolated but there really was underneath it all a warmth and appreciation of people.*

He had ideas and was very sure they were important. He went to see Einstein not long after he arrived in Princeton and told him about an idea he had regarding gravity. After explaining complicated mathematics to Einstein for about an hour, Einstein advised him to go and learn more physics. Apparently a physicist did publish a similar idea some years later.

In 1950 Nash received his doctorate from Princeton with a thesis entitled *Non-cooperative Games*. In the summer of that year he worked for the RAND Corporation where his work on game theory made him a leading expert on the Cold War conflict which dominated RAND's work. He worked there from time to time over the next few years as the Corporation tried to apply game theory to military and diplomatic strategy. Back at Princeton in the autumn of 1950 he began to work seriously on pure mathematical problems. It might seem that someone who had just introduced ideas which would, one day, be considered worthy of a Nobel Prize would have no problems finding an academic post. However, Nash's work was not seen at the time to be of outstanding importance and he saw that he needed to make his mark in other ways. We should also note that it was not really a move towards pure mathematics for he had always considered himself a pure mathematician. He had already obtained results on manifolds and algebraic varieties before writing his thesis on game theory. His famous theorem, that any compact real manifold is diffeomorphic to a component of a real-algebraic variety, was thought of by Nash as a possible result to fall back on if his work on game theory was not considered suitable for a doctoral thesis. He said in a recent interview:-

*I developed a very good idea in pure mathematics. I got what became Real Algebraic Manifolds. I could have published that earlier, but it wasn't rushed to publication. I took some time in writing it up. Somebody suggested that I was a prodigy. Another time it was suggested that I should be called "bug brains", because I had ideas, but they were sort of buggy or not perfectly sound. So that might have been an anticipation of mental problems. I mean, taking it at face value.*

In 1952 Nash published *Real Algebraic Manifolds* in the *Annals of Mathematics*. The most important result in this paper is that two real algebraic manifolds are equivalent if and only if they are analytically homeomorphic. Although publication of this paper on manifolds established him as a leading mathematician, not everyone at Princeton was prepared to see him join the Faculty there. This was nothing to do with his mathematical ability which everyone accepted as outstanding, but rather some mathematicians such as Artin felt that they could not have Nash as a colleague due to his aggressive personality.

Halmos received the following letter in early 1953 from Warren Ambrose relating to Nash :-

*There's no significant news from here, as always. Martin is appointing John Nash to an Assistant Professorship (not the Nash at Illinois, the one out of Princeton by Steenrod) and I'm pretty annoyed at that. Nash is a childish bright guy who wants to be "basically original," which I suppose is fine for those who have some basic originality in them. He also makes a damned fool of himself in various ways contrary to this philosophy. He recently heard of the unsolved problem about imbedding a Riemannian manifold isometrically in Euclidean space, felt that this was his sort of thing, provided the problem were sufficiently worthwhile to justify his efforts; so he proceeded to write to everyone in the math society to check on that, was told that it probably was, and proceeded to announce that he had solved it, modulo details, and told Mackey he would like to talk about it at the Harvard colloquium. Meanwhile he went to Levinson to inquire about a differential equation that intervened and Levinson says it is a system of partial differential equations and if he could only [ge] to the essentially simpler analog of a single ordinary differential equation it would be a damned good paper - and Nash had only the vaguest notions about the whole thing. So it is generally conceded he is getting nowhere and making an even bigger ass of himself than he has been previously supposed by those with less insight than myself. But we've got him and saved ourselves the possibility of having gotten a real mathematician. He's a bright guy but conceited as Hell, childish as Wiener, hasty as X, obstreperous as Y, for arbitrary X and Y.*

Ambrose, the author of this letter, and Nash had rubbed each other the wrong way for a while. They had played silly pranks on each other and Ambrose seems not to have been able to ignore Nash's digs in the way others had learned to do. It had been Ambrose who had said to Nash:-

*If you're so good, why don't you solve the embedding theorem for manifolds.*

From 1952 Nash had taught at the Massachusetts Institute of Technology but his teaching was unusual (and unpopular with students) and his examining methods were highly unorthodox. His research on the theory of real algebraic varieties, Riemannian geometry, parabolic and elliptic equations was, however, extremely deep and significant in the development of all these topics. His paper *C1 isometric imbeddings* was published in 1954 and *Chem.* in a review, noted that it:-

*... contains some surprising results on the C1-isometric imbedding into an Euclidean space of a Riemannian manifold with a positive definite C0-metric.*

Nash continued to develop this work in the paper *'The imbedding problem for Riemannian manifolds'* published in 1956. This paper contains his famous deep implicit function theorem. After this Nash worked on ideas that would appear in his paper *Continuity of solutions of parabolic and elliptic equations* which was published in the *American Journal of Mathematics* in 1958. Nash, however, was disappointed when he discovered that E De Giorgi had proved similar results by completely different methods.

The outstanding results which Nash had obtained in the course of a few years put him into contention for a 1958 Fields' Medal but since his work on parabolic and elliptic equations was still unpublished when the Committee made their decisions he did not make it. One imagines that the Committee would have expected him to be a leading contender, perhaps even a virtual certainty, for a 1962 Fields' Medal but mental illness destroyed his career long before those decisions were made.

During his time at MIT Nash began to have personal problems with his life which were in addition to the social difficulties he had always suffered. Colleagues said:-

*Nash was always forming intense friendships with men that had a romantic quality. He was very adolescent, always with the boys. He was very experimental - mostly he just kissed.*

He met Eleanor Stier and they had a son, John David Stier, who was born on 19 June 1953. Eleanor was a shy girl, lacking confidence, a little afraid of men, did not want to be involved. She found in Nash someone who was even less experienced than she was and found that attractive. Nash was looking emotional partners who were more interested in giving than receiving, and Eleanor, was very much that sort.

Nash did not want to marry Eleanor although she tried hard to persuade him. In the summer of 1954, while working for RAND, Nash was arrested in a police operation to trap homosexuals. He was dismissed from RAND.

One of Nash's students at MIT, Alicia Larde, became friendly with him and by the summer of 1955 they were seeing each other regularly. He also had a special friendship with a male graduate student at this time: Jack Bricker. Eleanor found out about Alicia in the spring of 1956 when she came to Nash's house and found him in bed with Alicia. Nash said to a friend:-

*My perfect little world is ruined, my perfect little world is ruined.*

Alicia did not seem too upset at discovering that Nash had a child with Eleanor and deduced that since the affair had been going on for three years, Nash was probably not serious about her. In 1956 Nash's parents found out about his continuing affair with Eleanor and about his son John David Stier. The shock may have contributed to the death of Nash's father soon after, but even if it did not Nash may have blamed himself. In February of 1957 Nash married Alicia; by the autumn of 1958 she was pregnant but, a couple of months later near the end of 1958, Nash's mental state became very disturbed.

At a New Year's Party Nash appeared at midnight dressed only with a nappy and a sash with "1959" written on it. He spent most of the evening curled up, like the baby he was dressed as, on his wife's lap. Some described his behaviour as stranger than usual. On 4 January he was back at the university and started to teach his game theory course. His opening comments to the class were:-

*The question occurs to me. Why are you here?*

One student immediately dropped the course Nash asked a graduate student to take over his course and vanished for a couple of weeks. When he returned he walked into the common room with a copy of the New York Times saying that it contained encrypted messages from outer space that were meant only for him. For a few days people thought he was playing an elaborate private joke. Norbert Wiener was one of the first to recognize that Nash's extreme eccentricities and personality problems were actually symptoms of a medical disorder. After months of bizarre behaviour, Alicia had her husband involuntarily hospitalised at McLean Hospital, a private psychiatric hospital outside of Boston. Upon his release, Nash abruptly resigned from MIT, withdrew his pension, and went to Europe, where he intended to renounce his US citizenship. Alicia left her newborn son with her mother, and followed the ill Nash. She then had Nash deported - back to the United States.

After their return, the two settled in Princeton where Alicia took a job. Nash's illness continued, transforming him into a frightening figure. He spent most of his time hanging around on the Princeton campus, talking about himself in the third person as Johann von Nassau, writing nonsensical postcards and making phone calls to former colleagues. They stoically listened to his endless discussions of numerology and world political affairs. Her husband's worsening condition depressed Alicia more and more.

In January 1961 the despondent Alicia, John's mother, and his sister Martha made the difficult decision to commit him to Trenton State Hospital in New Jersey where he endured insulin-coma therapy, an aggressive and risky treatment, five days a week for a month and a half. A long sad episode followed which included periods of hospital treatment, temporary recovery, then further treatment. Alicia divorced Nash in 1962. Nash spent a while with Eleanor and John David. In 1970 Alicia tried to help him, taking him in as a boarder, but he appeared to be lost to the world, removed from ordinary society, although he spent much of his time in the Mathematics Department at Princeton.

Slowly over many years Nash recovered. He delivered a paper at the tenth World Congress of Psychiatry in 1996 describing his illness. He was described in 1958 as the:-

*... most promising young mathematician in the world ...*

but he soon began to feel that:-

*... the staff at my university, the Massachusetts Institute of Technology, and later all of Boston were behaving strangely towards me. ... I started to see crypto-communists everywhere ... I started to think I was a man of great religious importance, and to hear voices all the time. I began to hear something like telephone calls in my head, from people opposed to my ideas. ... The delirium was like a dream from which I seemed never to awake.*

Despite spending periods in hospital because of his mental condition, his mathematical work continued to have success after success. He said:-

*I would not dare to say that there is a direct relation between mathematics and madness, but there is no doubt that great mathematicians suffer from maniacal characteristics, delirium and symptoms of schizophrenia.*

In the 1990s Nash made a recovery from the schizophrenia from which he had suffered since 1959. His ability to produce mathematics of the highest quality did not totally leave him. He said:-

*I would not treat myself as recovered if I could not produce good things in my work.*

Nash was awarded (jointly with Harsanyi and Selten) the 1994 Nobel Prize in Economic Science for his work on game theory. In 1999 he was awarded the Leroy P Steele Prize by the American Mathematical Society for a seminal contribution to research.

## MATHEMATICS IN KERALA

## MEGHNA GOYAL

Most the mathematics we know as "Indian" was recorded in Sanskrit, the language of Bhagvad Gita. The longevity of classical Sanskrit as a learned language, meant that the works of the mathematicians from preceding centuries continued to be studied and taught. The seven hundred years of layered innovations, rediscoveries, confusions, comparisons and critiques extending from the writing of the first ARYABHATTA and the second BHASKARA served as channels for some very remarkable developments in fourteenth to sixteenth century Kerala.

This was the home school of Madhava. Little is known about Madhava's personal history and education. He was born probably in the second half of the fourteenth century, and worked for a decade in an illam (traditional Keralese joint family estates) at IRINJALAKKUDA, near modern Kochi. The only writings of madhava currently known to survive are some astronomical treatise, some of which are dated in the first few years of the fifteenth century. But he is now most renowned for his discoveries in trigonometric power series, preserved only in a few isolated verses. These verses were studied in an illam by madhava's own pupil and his Paramesvara and his son damodara. Theredamodara taught Nilakantha and Jesthadeva, students from other nearby illams, both of whom in turn gave instruction to another scholar named Sankaravariyar.

The power series that Madhava's followers so carefully elucidated were equivalent to what we know as McLaurin's series expansions for the sine, cosine, and arctangent. In particular, Madhava found what is essentially Leibniz's infinite series for the ratio of the circumference of a circle to its diameter, and also derived a numerical value equivalent to  $\pi = 3.14159265359$ .

## AND THE NOBEL GOES TO!!!!

APARNA MENON

The Nobel Prizes were instituted by the final will of Alfred Nobel, a Swedish chemist, industrialist, and the inventor of dynamite. Alfred Nobel wrote several wills during his lifetime, the last one written on November 27, 1895, more than a year before he died. He signed it at the Swedish-Norwegian Club in Paris on November 27, 1895. Nobel's work had directly involved the creation of explosives, and he became increasingly uneasy with the military usage of his inventions. It is said that his will was motivated in part by his reading of a premature obituary of himself, published in error by a French newspaper on the occasion of the death of Nobel's brother Ludvig, which condemned Alfred as a "merchant of death." After his death, Alfred left 94 percent of his worth to the establishment of Six Nobel Prizes, awarded each year in the following categories: literature, physics, chemistry, peace, economics, and physiology & medicine. Notably absent from this list is an award for Mathematics. The reason for this conspicuous omission has been subject of extensive speculations.

Number of theories have been put forward to explain the omission of mathematics from Nobel's original list. The most colorful suggestion is that Nobel was miffed at mathematicians after discovering that his wife had had an affair with the Swedish mathematician Magnus Mittag-Leffler. Of all the theories, this is the easiest to dismiss, for the simple reason that Nobel never had a wife. Another oft-repeated suggestion is that Nobel hated mathematics after doing poorly in it at school. It may or may not be true that Nobel wasn't good at mathematics, but there is no evidence to suggest that a negative high school experience in the math class led to a desire to get back at the mathematicians later in life by not giving them one of his prizes.

By far the most likely explanation, is that he viewed mathematics as merely a tool used in the sciences and in engineering, not as a body of human intellectual achievement in its own right. He also did not single out biology, possibly likewise regarding it as just a tool for medicine, a not unreasonable view to have in the late 19th century.

There are more credible reasons as to why there is no Nobel Prize in math. Chiefly among them is simply the fact he didn't care much for mathematics, and that it was not considered a practical science from which humanity could benefit (a chief purpose for creating the Nobel Foundation). His will speaks of prizes for those "inventions or discoveries" of greatest practical benefit to mankind. (Probably as a result of this language, the physics prize has been awarded for experimental work much more often than for advances in theory.)

Further, at the time there existed already a well known Scandinavian prize for mathematicians. If Nobel knew about this prize he may have felt less compelled to add a competing prize for mathematicians in his will. Nobel's interest lay in practical developments, and so mathematics would not qualify. Yet all this boils down to is the circular thesis that there is no Nobel prize in mathematics because Nobel constructed his will in such a way that there should be no Nobel prize in mathematics. The contention that any sort of dispute with Mittag-Leffler would be an unlikely reason to leave mathematics out, simply because there were other mathematicians who might win the prize before.

Math is the universal language, and contributes to all the fields for which nobel prizes are awarded. Math is pure, even in it's highest forms. It is either right or wrong and applies correctly for only some applications. Math unlike literature doesn't evoke emotions, but a useful general tool for solving problems. Mathematics is the base field. It is a gateway to understanding in each of the 6 fields a prize is given. Math is inherently present in Physics, Chemistry, Economics, and Medicine. Maybe not as seeable, but included if you take a closer look, is Mathematics in Literature and definitely a degree of math in the business of Peace as well. For simple logic, as this is, tends to be the most viable and in actuality is more often, mathematically speaking, the truth.

Four mathematicians were to collect gold medals and glory in Madrid, Spain, having been declared winners of the 2006 Fields Medals — referred to as the 'Nobel prizes' of mathematics. But only three turned up.

Grigory Perelman, a reclusive Russian mathematician was indeed honored at the opening ceremony of the International Congress of Mathematicians. But after a round of applause, president of the International Mathematical Union John Ball said "I regret that Dr Perelman has declined to accept." No explanation was given. Perelman's presence at the prize-giving ceremony, presided over by the King of Spain, was not expected. He was invited to give a plenary lecture, but never replied.

A UK newspaper, The Sunday Telegraph, reported that it had tracked down Perelman to a flat in St Petersburg, where he reportedly lives with his mother. The mathematician is quoted as saying: "I do not think anything that I say can be of the slightest public interest. I have published all my calculations. This is what I can offer the public."

Nobel prizes have been turned down six times: twice by the winners, and four times because winners were forbidden to accept the award by their home countries. But the situation is unprecedented for the Fields medal.

Some recipients of the Nobel Prize in other fields also have notable achievements in and/or have made outstanding contributions to mathematics; for example, Bertrand Russell was awarded the Nobel Prize in Literature (1950) and Max Born and Walther Bothe shared the Nobel Prize in Physics (1954). Some others with advanced credentials in mathematics and/or who are known primarily as mathematicians have been awarded the Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel: Kenneth Arrow (1972), Leonid Kantorovich (1975), John Forbes Nash (1994), Clive W. J. Granger (2003), Robert J. Aumann (who shared the 2005 Prize with Thomas C. Schelling), and Roger Myerson and Eric Maskin (2007).

Several prizes in mathematics have some similarities to the Nobel Prize. The Fields Medal is often described as the "Nobel Prize of mathematics", but it differs in being awarded only once every four years to people younger than forty years old. Other prestigious prizes in mathematics are the Crafoord Prize, awarded by the Royal Swedish Academy of Sciences since 1982; the Abel Prize, awarded by the Norwegian government beginning in 2001; the Wolf Prize awarded once a year by the Wolf Foundation; the Shaw Prize in mathematical sciences awarded since 2004; and the Gauss Prize, granted jointly by the International Mathematical Union and the German Mathematical Society for "outstanding mathematical contributions that have found significant applications outside of mathematics," and introduced at the International Congress of Mathematicians in 2006. The Clay Mathematics Institute has devised seven "Millennium Problems," whose solution results in a significant cash award: since it has a clear, predetermined objective for its award and since it can be awarded whenever a problem is solved, this prize also differs from the Nobel Prizes.

A sixth Nobel prize in economic science was added in 1969. The addition of this new Nobel prize suggests the possibility at some future date of a seventh Nobel prize. With the blossoming of computer science, statistics, and applied mathematics in addition to mathematics itself, a strong case could be made for a new Nobel prize in the mathematical sciences. Let us all hope that day is not too far.

## PATRIARCHY HAD A BEGINNING, IT WILL HAVE AN END TOO

UPASANA

The common starting point of all feminist ideas is the belief that women are disadvantaged in comparison to men and this disadvantage is not natural or inevitable result of biological difference but something that can be and should be challenged and changed.

My name is Kamaljeet. In Gujarat, I was cut open and the first words my unborn child heard, were "Jai Shri Ram!" and I am Manorma Devi too, killed by those ruthless men who shot six bullets in my vagina to remove the traces of rape. I am also the one who is just 16 years old and is fighting to save my land from these so called business class. My raped, mutilated burnt body is still lying in the fields of Singur. I am Surekha, and I worked here before being raped and then killed in the streets of Khairlanji. But then the media prints my naked photos everyday ..... to portray, shape, measure, expose and sell me and my existence everyday as a 'beauty queen' or a film star.

I die in wombs, everyday. I am killed right after birth. I am priced for marriage, and killed when I fail to pay them. Yet I live and fight. In the kitchen, in the fields, in the factories, in the universities, in the workplace I fight ..... for my identity, for my life.

The touches in the public buses, the snide, remarks, hooting, gestures, insults, humiliations. I survive them everyday and yet I fight. I have fought against the colonizers. I have fought for my right to education, property, to vote. I will always do that for justice and dignity. The history of my oppression is many centuries old. What I achieved a century ago, in the form of "INTERNATIONAL WOMEN'S DAY"

is a milestone in my fight of organized resistance. Because March 8<sup>th</sup> is not an imagination either of Archies Gallery or United nations. It is a day I have achieved with my struggles. My greatest weapon is my courage and my conviction to fight back. I know all the 1000 faces of patriarchy in the forms of caste, class, religion, state, imperialism and feudalism. Only after defeating inequality, injustice and discrimination, I will finally be liberated....

I have to take revenge of all the things done to me. I was an important part of history but absent from it. For it is a perennial puzzle why no women wrote a word of that extra ordinary literature when every other man was capable of a song. Women with a strong character in the plays of Shakespeare, in fiction had no importance in real life. She is all but absent from history.

I wish to be re-incarnated as Captain Cook, Columbus, Vasco-Da-Gama and discover the new world that would not have any sign of male dominance and peace, harmony and equality would dwell amongst every one.

### Journey of a Man

I was born; A woman was there to hold me: **My Mother**

I grew as a child, A woman was there to take care of me and play with me: **My sister.**

I went to school; A woman was there to help me learn: **My teacher**

I became depressed whenever I lost, A woman was there to offer a shoulder: **My girlfriend**

I needed company, compatibility and love, A woman was there for me ; **My wife**

I became tough, A woman was there to melt me : **My daughter**

When I die, a woman is there to absorb me in : **My motherland!**

## THE EXISTENCE OF GOD

TANVI KAPOOR

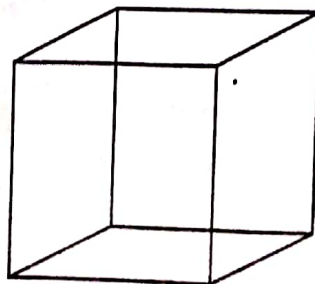
Since time immemorial mankind has debated on this question which still eludes the brightest of minds.

There have been countless discussions and even lives have been taken over this question. Science has always questioned what seems irrational and so science and God have come into conflict many a times.

The question comes down to faith and experiencing miracles. It also boils down to the fact that each one of us experiences world differently. Things are relative for everyone so to say. Also we perceive things in totally different ways. And probably when we find someone who thinks like us we tend to fall in love with them.

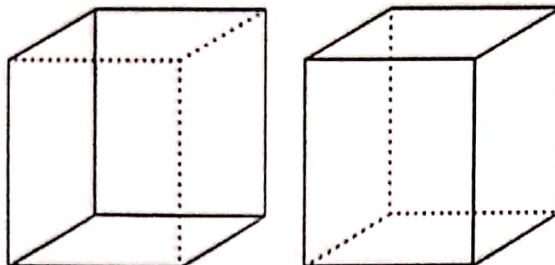
Ohh God! I am digressing again. (Haha...Ironic that I said "Ohh God" in a article questioning existence of God. Though I say you should not get fooled by my figure of speech..it has got nothing to do on where I stand on this matter. )

As the question boils down to perception ,instead of going into a deeper technical way of explaining my view I will give a simple example of the Necker cube:





The Necker Cube is a 12 line drawing. It is a wire-frame drawing of a cube in oblique perspective, which means that parallel edges of the cube are drawn as parallel lines in the picture. When the two lines cross, the picture does not show which is in front and which is behind. This makes the picture ambiguous; it can be interpreted two different ways. When a person stares at the picture, it will often seem to flip back and forth between the two valid interpretations.



The two interpretations which keep flipping in our mind

Basically there are not two cubes. In fact there is none. It is just a 2-D drawing of 12 lines. Nothing more.

So my take is that maybe neither of the two - theist side nor the atheist side is right. Maybe God does exist but is not omnipotent and omnipresent and other such assumptions, Something in the middle scale of extreme of atheism and theism: **AGNOSTICISM**.

## REALITY SHOWS AND INDIAN SOCIETY

**SANYA SEHGAL**

Reality television portrays a modified and highly influenced form of reality, utilizing sensationalism to attract viewers and so to generate advertising profits. Participants are often placed in unusual locations or abnormal situations, and are sometimes coached to act in specific scripted ways by off-screen "story editors".

Reality shows as we know today is favorite genre of all Television producers.

On one hand they generate good revenues for Television Industry and on the other hand they create a very good platform for thousands of Indian youngsters who want to achieve great things in their field of interests. Be it Dancing, Singing, doing Comedy, modeling or other talents, reality shows do give a hope to the parents of young children that there is more to life than being a Doctor or an Engineer.

These shows help remove the phobia which typical Indian middle class parents have - what will happen to the future of my kid? There are many shows running on the television that expose different talents of not only youngsters but people of all ages. Moreover, there have been many shows in the recent past which bring out talents nobody could ever think of. They have given a great platform to normal home makers, children below 15 and old people as well. There have been shows ranging from becoming thin, cooking to surviving under adverse conditions in exotic locations and overcoming fears.

Shows like Emotional Atyaachar, Big Switch etc. brought a drastic change in the television history. Now people can have all kinds of experiences by participating in such shows. Also famous shows like Splitsvilla and Truth Love Cash gave an awesome opportunity to young people to find their true love fighting all obstacles away. With shows like these nothing in the world seems impossible.

But as no coin can have one side, reality shows also have a darker side to them. Reality, as shown by some prime-time shows, is no longer palatable to the Indian family due to the generous serving of foul language, sexual innuendo and abusive talk dished out to viewers in an attempt to plump up TRP ratings. As the TV media has reached all the nooks and corners of the country these days and the people of all demographics watch such reality shows, the programme producers should not be instrumental in abolishing the Indian traditions.

Recent reality shows like BIGG BOSS and Rakhi ka Insaaf entertained almost everyone but also left it with many controversies and absurd notions. There were quite a few scenes that made fun of many things that are considered to be of high importance in Indian society.

Apart from these, there are several bad things such as prejudices, superstitions, wrong beliefs; baseless fear of sins etc., pictured in many Indian reality shows openly. Not only this most of the shows are scripted and the results are already decided. This is clearly a big slap on so many peoples face who sit anxiously in front of their TV channels spending loads of money voting for their favorite contestants. Violence and improper language is used so often that it seems to be a normal ritual in the society. This misguides our youth leading them to a wrong path ruining their future completely.

Therefore entertainment can be more realistic, if they are planned on the things accepted in the country. If in a few years, the producers and directors attempt to change the entire country's culture, it will be a rootless attempt. It may be successful for a temporary period, but in the long run, it will not survive. Because, the root of the ancient Indian culture is so deeply spread among all members of the society, for a few days (years) any such attempt may sway a fraction (the young generation) of the society, but neither all and nor for ever.

**THE AILING PLANET****SANYA SEHGAL**

*"Each one of us is a cause of global warming, but each of us can become part of the solution: in the decisions we make on what we buy, the amount of electricity we use, the cars we drive, and how we live our lives. We can even make choices to bring our Individual carbon emissions to zero"*

As the delicate balance of time moves on, everybody can notice the change in the nature around us, in the weather patterns, the sudden calamities and much more. All these things can be summarized under one topic 'Global Warming'. Global Warming is a fast increasing problem which needs to be dealt quickly and it can only be solved or at least slowed down by the cooperation and immediate actions of everyone. It has become one of the largest threats faced by all of us.

Pollution or say on a wider basis burning of fossil fuels along with greenhouse gases like carbon di oxide, methane etc. have become an issue to ponder upon now a days. Industrialization has undoubtedly been a remarkable achievement in man's life but no good thing comes alone. A negative aspect always accompanies it. Deforestation is the most disastrous consequence of industrialization and it will leave us moaning if we do not stop our callous practices. There are also many products that we use in our daily life that contribute to the emission of pollutants. These human activities have changed the climatic patterns. The places which used to be dry throughout the year have seen floods; few dormant volcanoes have become active in the past few years. Not only this, we also come across irregular rainfall patterns this year. All this just acts as a last warning for all of us so that we mend our ways now and stop it before it is too late.

The problems are many but the solution is just one, its US. We will have to make our lifestyle green and environment friendly. The alarming need is to just sit down and think about our wrong deeds. Making small changes in our decisions of what we buy, the products we use can avoid huge changes in the future. As an individual we should mainly focus on decreasing the amount of things we make use of that directly or indirectly harm the environment and are a cause of carbon emission. After this only we can think of taking steps at a larger scale. Carpooling, use of recyclable products and solar energy can be few things that can be brought into action. Moreover, youth in one s country is an effective and important means of carrying forward the significance of putting an end to global warming. Awareness programs and awakening rallies can be of great aid also. In addition to this government should also be strict with the rules and enact some acts helping in the reduction of unlawful practices towards nature.

Thus in a nutshell it can be concluded that even our precise decisions can bring a colossal transformation. And now is the time for action, now is the time to make sure our voice is heard. However, if we don't stop being cruel to nature now then at the end what we will be left with is NOTHING.

**CONFESSIONS OF A GIRL CHILD****TANISHA MANAW**

My story unfolds

I would tell them of the drought,

Sold to unemployment,

to be told and retold

I would tell them of poverty,

sold to flesh trade,

I am the girl who was 'sold'.

I would tell them of my three children

sold to landlessness,

and the future they might never seek.

sold to alienation,

They said I was 14

sold to corporate,

Rs.40 was the price

But they wanted a story

and their kin.

Accused: my kin.

of the 'sale' of girl.

Neglected the causes,

I am the girl that was sold,

If only I'd been given

highlighted 'events'.

and this is my story.

a chance to speak,

If only I was more than

I would talk of my Kalahandi

just an actor

that was never a 'picture of hell'

the script being my story

I would talk of my people

unfamiliar to me.

who were neither scavengers nor dogs.

Heavily inspired from an article by  
Dr.P.Sainath, Rural Affairs Editor for  
*The Hindu*.

## LEAVING HOME

UMANG AGRAWAL

*(This is dedicated to all my outstation friends for whom each day is full of surprises some nice, while others are not so pleasant.)*

She is one among those million students who are compelled to stay away from their dear ones, for the sake of their better future. Leaving family and childhood friends and staying independently in the fast paced city of Delhi seemed like an impossible task for her and despite the heavily crowded streets and the jam packed roads of Delhi, she felt lonely and yearned for good company.

When college began, her days got better, as caught between the maddening timetables and chaotic college atmosphere, she somewhere forgot about her sadness and absolute loneliness. So, though her days were getting better and better, her nights became even worse as she was afraid both of the eerie darkness as well as the state of being completely alone. While days brought some sort of relief, nights became unbearable and brought with them just tears and a nagging sense of discomfort.

Though she was constantly in touch with her family through phone and technology, she still missed the feeling of "home" and felt unsafe without the strong arms of family around her.

Even now months after college began, there is always an uneasy feeling in her when we walk back home. She says nothing, but I understand that her home is nothing more than just a mere building made of bricks, a house where there is no family to question you on your late arrival and no sibling to pester you with irritating questions.

For me knowing her has been life's greatest lessons and now before complaining about the food at my house or fighting with my brother... I think of what I would do without them... of how life without them would seem impossible in every small and big task; in every young and old stage of my life.

## AU REVOIR: LEAVING COLLEGE

Thinking of getting into college to enter a new phase of life to find that we've entered a school yet again. To initially getting terrified by the epsilons and deltas to using mathematical terms in our daily conversations. This is impact the three years of doing Maths hons has had on our lives.  
-Kirat Dhillon

As my three years in the Mathematics Department of the college draw a close, I can sum them up as the best time of my life. The teachers of the department have been our guiding figures as well as buddies and I shall always be grateful for what they've taught us academically and otherwise. As for my friends we joined together as classmates, but the memories of college that we have made us stronger than family.  
-Karisma Chawla

With excitement and nervousness mixed together, I entered college, the "passage de tour" to another world of Freedom, Independence, Empowerment of being a feminist, the pride of being an LSRian. The realization of being an achiever. The three years at LSR have been truly amazing, and something I'll cherish forever.  
-Tanvi Kapoor

By the end of college I might have not discovered myself as a mathematician (as anticipated) but I did make some great friends who supported me through each day, from the assignments, To getting coffee just in the middle of a lecture and To understanding math where we didn't do any calculations. On a serious note, I've tried To make full use of any opportunity thrown my way and its helped me grow as a person. I'd like To take this opportunity To thank everyone who made this possible.  
-Kritika Khemka

It seems to me that my three years of graduation have passed in the blink of an eye. With a hardly a week of college left for me to attend, I can't help but wish that the time could somehow be extended a bit more, partly because I'm a little scared of what awaits in the future, but more so because I've thoroughly enjoyed studying in the Maths Department of LSR.  
-Rasika Chopra

From the dance society to the mathematics department, the warmth that pervades this college instills a sense of belongingness that is unique to this institute. Truman Capote said "I've been trying to find the place where I and my things belong together. I'm not quite sure where that is just yet. But I know what it's like." I can say that I've found my place and will be deeply saddened to leave.  
-Megha Bhagat

Graduation  
Exciting, Emotional  
Saying final goodbyes  
Tears welling in eyes  
Commencement  
-Katie O'Connell

LSR has been a life changing experience. There are so many things about this college that I know I am going to miss; the Tut block, the mass bunks, cribbing about the assignments, Tarang and most importantly 'The Magic Of LSR'. For me this journey called 'LSR' does not end with a 'goodbye' but rather a farewell and a hope that we will meet again.  
- Payal Bedi

Why was I never on time for probably anything in class. Probably because years later I would have something to be nostalgic about. rushed entrances, hurried assignments, proxies and the infinite bunks!!

-Anusha Raheja

For all the times, we reached college at 9 for the 8:45 class and made the evergreen excuse of traffic jam for late entry. Those extremely awaited DUTA strikes. The staple maggi @ Nescafe. The helpless glances in between classes. The song sessions--- courtesy Mahesh sir. The never ending filmi funda competitions. The run for the back benches during assignments. The perennially short attendance. And to the crazy people that is us. Retards that we are, how did we come this far??? Third year. Like they said, that all you touch and all you see, is all your life will ever be. And now all we have is memories. Just plain memories like a half-filled or half-empty glass of water..

-Saloni Jain

I'll miss college! That's for sure, but more than that I'll miss being the President. The reasons being-

1. The respect, power and authority is so cool.
  2. You get to officially bunk classes
  3. You get to officially pick up phone calls during classes, even though it's a pre-recorded call.
  4. You get to say fancy things like, "I have to leave, I have a meeting"!!
  5. The number of "I love you" messages you get after getting a class cancelled is not funny. Also, if you are lucky, the class blesses you!!
  6. You get to know teachers closely. Believe me, it's a privilege.
  7. You get to sign on official documents with designation as President. At least, it gave me the feeling as if I'm no less than Pratibha!!!
  8. You can say, "My secretary will handle it" even though you don't mean it.
- The list goes on and on. I'll will now leave it on others to unravel the mystery. -Divyanka Kapoor

## TETE-A-TETE WITH THE ALUMNI

### MY JOURNEY FROM LSR TO OXFORD

**AKANKSHA KOCHAR**

According to me Oxford is the best place to be for students...not only because you will be surrounded by highly educated and intellectual people but also by so many different cultures... The few months I have spent in Oxford are the most memorable one...from matriculation to lectures to BOP's (big open parties) to Balls (Ball room) to boat races to theatres to....the list I think is never ending!! Culturally this place is flooded... I couldn't believe when my friends actually made an effort to celebrate Diwali along with me ...so the people you'll find here are just so good that you won't miss your family often! The beauty of this place is captivating and for the first few months I was just admiring it because I thought that I was in some fairytale.

I see LSR as my second home n the friends and teachers as a part of my family. Although I am here in Oxford, I still have stayed in touch with everyone and still haven't forgotten the stuff we did in our 3 yrs of undergrad...from dancing on any occasion to spending most of the time in M block to getting classes cancelled as much as possible.

Moreover, one big change in the style of education that I learnt after coming to Oxford is that the teachers back home actually put an effort in explaining the students all concepts....but over here our lecturers expect us to do a pre reading on the topic of study and be good at the topic before the lecture.....also the relation between student n teachers here is not that strong!!

Last but not the least, I would only say that I miss LSR no matter how beautiful Oxford is!!!

### TRANSITION FROM COLLEGE TO WORK

**RUSHIL PRAKASH**

The transition from college to work has been a life changing experience for me. The contrasting features between college and office are:

- Individual based To Team based
  - Self planned to project plan
  - Last minute preparation to day to day discipline
  - Answer to available and known to solution not known
  - Remember the answer to arrive at an answer
  - Marks based to productivity based
  - Evaluated by someone else to start with self-evaluation
  - Deadlines not all that tough to Very strict dead lines
  - Canteen behavior to corporate etiquette
  - Home to college to Alone and corporate
  - Prescribed syllabus to Each day's activity is unique
- Understanding theory to Activity based learning

## A NO BRAINER

•**Theorem** . All governments are unjust.

*Proof:* To establish the truth of this proposition we need only show it true for an arbitrary government. But by definition, a government that is arbitrary is unjust.

•**Theorem** . Death comes to no man.

*Proof:* As is well known and celebrated in legend and song, when we approach death, our whole life flashes in front of us. This short review—if it is to be complete—must also include the moment we approached death and the flashback of our life. But this second flash must by the necessity of completeness include another flash of life. And that flashback must include still another and another, etc., etc. Hence, although we may approach death, all eternity is not enough time for us to reach it.

—This is known as "Leinbach's Proof" from *Flight into Darkness* by Arthur Schnitzler.

•**Theorem** . Napoleon was a poor general.

*Proof:* Most men have an even number of arms. Napoleon was warned that Wellington would meet him at Waterloo. To be forewarned is to be forearmed. But four arms is certainly an odd number of arms for a man. The only number that is both even and odd is infinity. Therefore, Napoleon had an infinite number of arms in his battle against Wellington. Since Napoleon still lost the battle, he must have been a very poor general indeed.

•**Theorem** . Every horse has an infinite number of legs.

*Proof:* Horses have an even number of legs. Behind they have two legs, and in front they have fore legs. This makes six legs, which is certainly an odd number of legs for a horse. But the only number that is both odd and even is infinity. Therefore, horses have an infinite number of legs.

Q: What did zero say to eight?

A: Nice belt!!

Q: What do you call a mathematician's bird that won't eat?

A: A poly "no meal"

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!

Q: What is purple and commutative?

A: An abelian grape...

##In some alley, a function meets up with a differential operator:

"Get out of my way - or I'll differentiate you till you're zero!"

"Try it - I'm  $e^x$ ..."

"Too bad... I'm  $d/dy$ ."

Q: Why isn't the pope is the greatest cardinal?

A: Because every pope has a successor.

Q: Why was Cauchy convicted in the USA for violating its constitution?

A: Because he conspired with Schwarz in advocating inequality.

### TOP $\ln(e^{10})$ REASONS WHY 'e' IS BETTER THAN PI:

10) e is easier to spell than pi.

9)  $\pi \approx 3.14$  while  $e \approx 2.718281828459045...$

8) The character for e can be found on a keyboard, but pi sure can't.

7) Everybody fights for their piece of the pie.

6)  $\ln(\pi)$  is a really nasty number, but  $\ln(e) = 1$ .

5) e is used in calculus while pi is used in baby geometry.

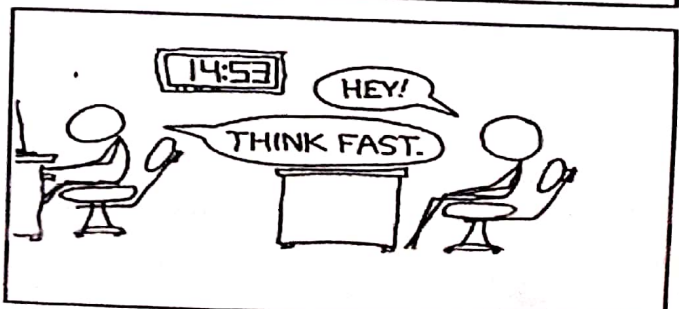
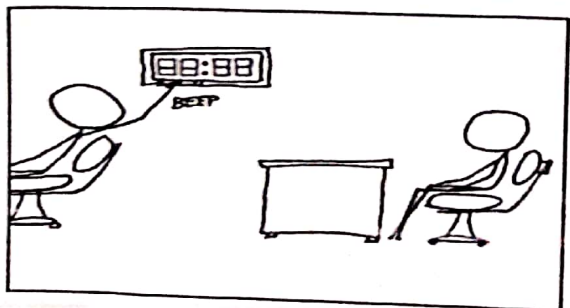
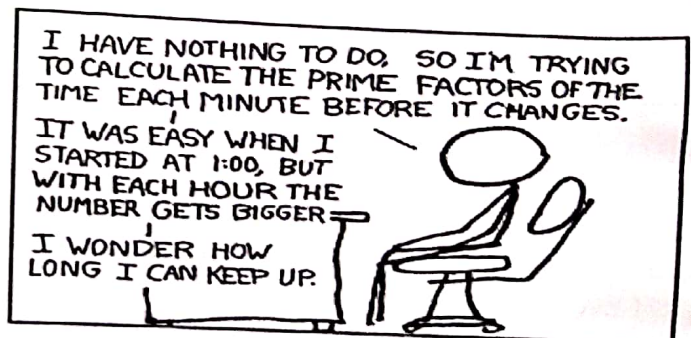
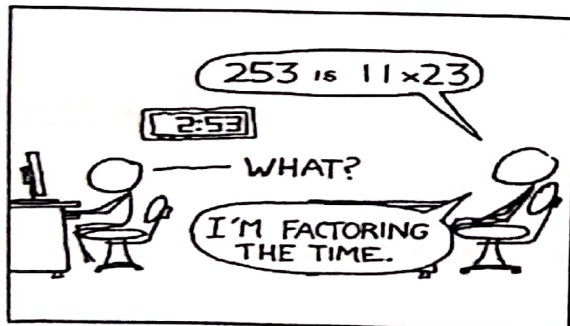
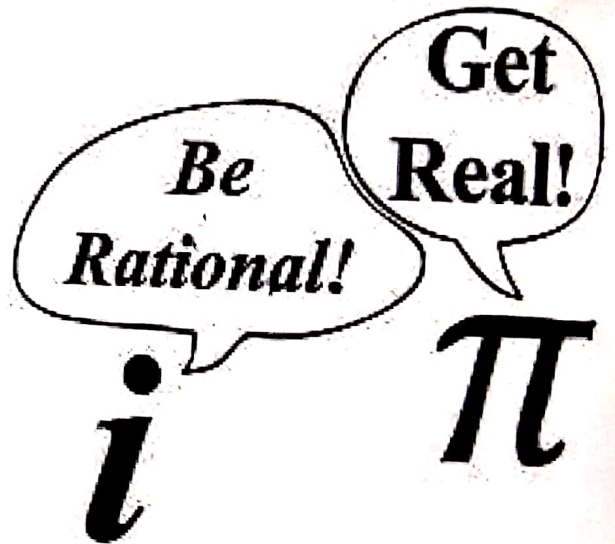
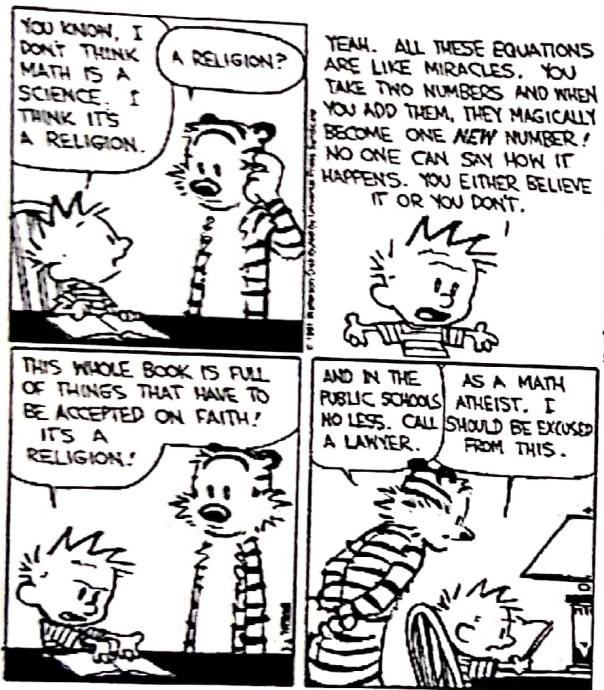
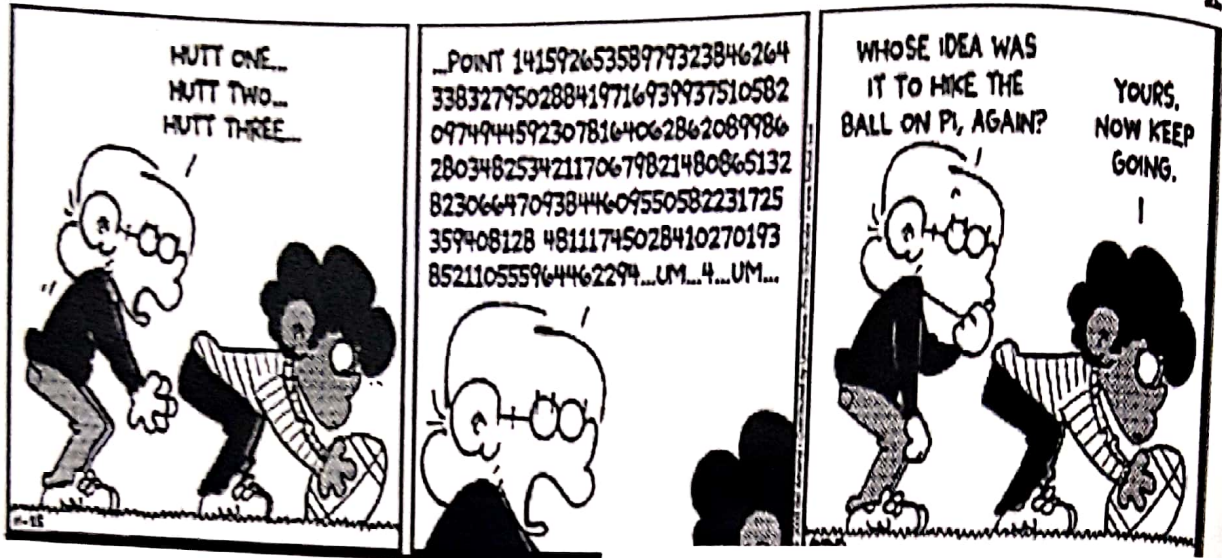
4) 'e' is the most commonly picked vowel in Wheel of Fortune.

3) e stands for Euler's Number, pi doesn't stand for squat.

2) You don't need to know Greek to be able to use e.

1) You can't confuse é with a food product.

# JUST GRAFFITI!



# DOWN MEMORY LANE !!!

Maths (hons.)-3<sup>rd</sup> year in the eyes of TANVI KAPOOR

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I hereby introduce you to the batch of 2011 !

First up, roll number 008, **SACHI SARWAGI**, who seemed never to sit and breathe, always onto some fair deed !

Next in line 117, **NEHA CHOWDHURY**, who was the Coolest Treasurer, at the end of 3yrs, became a Serial Bunker !

In comes our very own, A(1)47, **SHREYA GARG**, who with her sudden one-liners in mid-class, would make every teacher Stop !

Then is the Chota Packet, **URJHA SHAH**, who with her all-smiles, early morning 'HI' made you forget, it's just 8:45 !

Make way for Volleyball champ, **SHUBHANGI SUD**, who is the Undisputed 'Filmi-Funda' Queen, and her love for Sunny Deol was unforeseen !

Number 365, **KRITIKA KHEMKA**, sitting in a corner solving the Rubik's cube, known for her love for the camera, front and back, that is !

In comes number 371, **PAYAL BEDI**, who with her brilliant marks, be it assignments, mid-terms or University, made us all see daylight- Green !

**SALONI JAIN**, number 455, known to be always on a medical-leave, be it August, September or January !

Dancing her way in is number 460, **KARISMA CHAWLA**, who with dancing ability and any-corridor 'Hey!', would make anybody's day !

Close your ears coz next up is number 461, **TANISHA MANAW**, who when gets to talking and laughing, we all go into hiding !

Then is number 466, **TANVI KAPOOR**, which btw is Me, known for flare for writing, always seen with a happy glee !

She is cute, petite, and mind it guys, a Smarty. She is our very own, number 485, 'Double-shots' Polo **PALLAVI** !

We hear music, we imagine her, See a pout, envision her, Our Queen of Dancing, accolades everyone for number 487, **SHAGUN** !

This one's never seen with a book, ( sans Novels) So if, In for bunking, want some crazy fun, number 515, **ANUSHA RAHEJA**'s direction is where we look !

Never on time, candidate for a reserved seat, attendance short are just some of the things famous about number 526, **ASTHA AGARWAL** !

Number 528, **RASIKA CHOPRA**, whose beautiful hair and the cutest smile, otherwise add to her Prim 'n' Proper Style !

Next up, number 532, **MEGHA BHAGAT**, who is torn between choosing a job at EnY, or to be a Googler !

Missed a class, need beautiful, immaculate and complete notes, the answer to your prayers, Ladies is number 535, **KIRAT DHILLON** !

The little wonder, resident of the otherwise deserted Front Bench, known for her anxiety attacks before every assignment, is number 536, **KRITIKA NEMA** !

Never sit left, right or in-front of this Chiller Freak, coz number 552, **BHAVYA KUMAR**, is known to make even a calm soul Shriek !

Always seen with her headphones, or doodling some work of Art, is the quiet girl, number 571, **MAHUA MATHUR** !

Her love for posing for pictures, and watching TV shows back to back, goes beyond normalcy, she is our Guwahati girl, **PRIYANKA SARAF** !

She gave sneaking in and out of class a new definition, always seated on the last bench, is number 605, **SAILY AGARWAL** !

The bestest President, the kind-hearted and 'un-blemished' soul, are some of the superlatives to describe, number 616, **DIVYANKA KAPOOR** !

The towering and cheeky, 618, **HIMANI**, who by being my car and now-metro buddy, gave me some of the best memories !

Next number 622, **AVNI ARORA**, who with her "People Listen" came up with, some of the wackiest ideas one would ever know !

Last but not the least, is Singing Sensation, **SAKSHI GUPTA**, who joined our class a little late, hope your wedding is awesome, due May !

The three years we've spent together are to cherish forever, and now that our lives change from what We promise to be **FRIENDS FOREVER!!!!**

**OVERALL DESIGN & OUTLAY**

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**EDITOR**

: **TANISHA MANAW**

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