MATHOLOGIC

DEPARTMENT OF MATHEMATICS
GARGI COLLEGE
UNIVERSITY OF DELHI

2022-2023

Editorial Board Note

Mathematics is the language of the universe. Mathematics is apparently the subject that deals with the number system, operations, and calculations; basically, it is a much-needed subject in our world. Wherever there is a number, there is beauty. But when you are majoring in this subject, solving partial differentials, wrecking your brain to find the order and understand the highest degree, and pressuring your brain cells to understand the proof of theorems. Theorems ,that are, written in a language that appears easy to read but hard to perceive.

Amidst this, here we are, bringing you an opportunity to dive into the beauty of mathematics, mainly introducing you to how to find beauty even in the complex things as the complexity in the equations of mathematics is simpler than problems in life:|

The editorial board extends its gratitude to all the students of the mathematics department, the creative team, union members of Mathema, and our teacher advisors for their support, enthusiasm, and encouragement throughout the process of compiling the annual magazine, beautifully.

With this, we hope you find the magazine an informative and enjoyable read.

Convener's Note

In the academic year 2016, the mathematics association of our department Mathema came into existence to promote and contribute towards learning and development of students beyond classroom. The Association proudly released its first issue of the newsletter "Mathologic" in April 2018, the Golden Jubilee year of Gargi College

This magazine is our annual publication and provides an ideal platform for students to express their creativity in Mathematics. Through this issue, I along with other faculty advisors recognise the efforts of all those who worked on this issue from different angles. I would also thank our Principal Prof Sangeeta Bhatia in providing continuous support in organising departmental events.

On behalf of our department,I wish the third year students success in their future endeavours.

I also hope for active participation of other students to bring more enthralling issues.

"Creativity is seeing what everyone else has seen, and thinking what no one has thought."

--Albert Einstein

Happy reading!!

Best wishes,

Convener

From Union President

I feel overwhelmed on reaching the end of this journey. It feels not so long ago that I gave my first interview to be a part of the Mathema family. During my first year, I remember being thrilled to be working on Mathologic as an editorial board member, and three years down that lane, now I feel proud of my team and their hard work to make Mathologic'23, a huge success. Every year, Mathologic feels a happy ending to the year, like the one we always wish for in movies. It is a replica of the team's hard work, dedication and creativity, giving you a kaleidoscope of new thoughts meeting old theorems, and bringing forth beautiful and unseen observations.

The team and I have come a long way, from meeting and celebrating the formation of the new union a year ago to becoming practically a small family on this huge campus. Mathema's journey of 2022-23 was challenging and memorable in its own way, every event we worked on, was the first of its kind after the pandemic. The expectations everyone else and we ourselves had from us to make every occasion, big or small a memorable one was tremendous. We wanted to do new things, learn and improvise, execute every minute idea successfully, and most importantly make memories leaving behind no regrets.

The one lesson that this journey taught me which I'll carry along forever and wish my dear juniors to not forget is to do everything with their whole heart and brainstorm out of the box in every situation may it be an assignment, any competition, society work, competitive exams, internship or even planning a day out with your friends.

My journey as Mathema's president is an unmatched memory, filled with happiness, efforts, last-minute preparations, and multitasking but my favorite thing among all is the happy faces of my team members when they successfully finish an event. I feel fortunate to be a part of Mathema, the mathematics department union, and getting this opportunity to work with such a beautiful team and inspiring union advisors. The legacy I wish and worked to leave behind is, to smile through hard times and never miss an opportunity to celebrate even the smallest occasions and achievements.

Regards
Anushka
President 2022-23

From Editor's Desk

~For everyone who feels like an odd lamb.

A few days back, I went for a pottery activity. As an amateur I am, I made a pot with an absolutely distorted neck and uneven design on it. But I don't know, while I was shaping the pot with my hands something in me was overwhelmed?, I guess. I don't know how to name or express that feeling, but it was something that screamed "mine". This is what this magazine means to me. Every word that has been put inside this edition, has gone through the brilliant minds of everyone who was involved, numerous times. I remember when we were done with the draft, it was an absolutely overwhelming emotion for me as well as the entire team.

Not to lie, but I've always felt like I'm more inclined toward art, literature, and stuff like this. The idea behind this magazine was to give voice to such people. People who want to see how maths is involved behind poker. Is there a horizon for things like fashion, women's issues, logic, architecture etc. One of the writers, who gave us their article for this edition even used "beauty and beast" as a metaphor to describe mathematics. Lastly, the magazine also has expressed how mathematical equations and concepts are beautiful in themselves, which even I can't argue with.

I hope everyone who lands their hand on this magazine finds something to take away. I hope when you read this magazine, you see yourself as one of us. I hope you don't change your interests, but find a horizon between your interests and the universal language- Mathematics. I did, we all did. I hope you too find your own "gut" through this edition.

Regards
Niharika
Editorial Head 2022-23

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Introduction to theme

How we perceive mathematics depends on the way we are taught this subject in school.
Hence we're here to change or to improvise that perception through this 5th edition of Mathologic and an opportunity to understand the beauty behind the language of mysterious powers that everyone finds hard to understand.

Beauty is in everything. You just need to change your way of looking at something or should we say change your "Angle of Elevation and Depression":). Likewise, there are only a few who can see beauty in nature and relate it to mathematics. People see mathematics as a very hard and brainstorming subject, which is true to some extent. But do you know its beauty that is in front of us but somehow hidden? If not, then you landed at the right place, and we'll unravel this mystery of how the complexity of equations and theorems can be beautiful. And even if you know, then also, we have many new things waiting for you.
Now you'll get why Mathematician Edward Frenkel said that mathematics can be full of infinite possibilities as well as elegance and beauty.

For example, Euler's equation, crowned as the most elegant equation of mathematics, does not fail to amaze aspiring mathematicians with the perfect blend of mathematical operations and well-known constants. We know that you already want to dive into the details of it, worry not we have a whole article coming up next that will provide the essence of this equation

Index

Rock-Paper-Scissors

~Kinjal
B.Sc. (H) Mathematics, 2nd year

A widely known mathematical concept: Game theory is now getting traction in contemporary times through social media. It became a go-to- solution for many experts who are working on strategic models. Game theory primarily deals with giving out mathematical models for strategic actions. These models begin with some conditions and assumptions upon which the whole structure is constructed using logic and past trends thus giving a definite formula and theory.

Logic, the word in question, refers to a set of principles and criteria for the validity of inferences and arguments. And the fact is inherently acknowledged that everybody has a different type of thinking pattern resulting in many derivatives of logic that may be leading to the same result. This diversity arising in the sample pool is due to minor differences in logic. This diversity itself is a work of art in contemporary times.

Game theory has a number of applications in real-life problems. We can predict the voter preferences in an election and it helps us analyze the EQ of the voter population and how it is affected through external influencing factors like advertisement through media. We can also predict what the political party will be offering to the civilians.

Similarly, this theory is a driving concept in the business arena where negotiations, compensations, management, and planning are some of the dominating processes. These processes require elaborate strategic planning by logic and reasoning to effectively deal with the problem at hand.

A world with complex and inter-related systems combined with interactions between the elements of these systems does get a little intimidating but a strategic approach to understand them and deal with them is the key to unlocking beautifully simplified minute
cases.


"MATHEMATICS IS LIKE LOVE– A SIMPLE IDEA BUT IT CAN GET COMPLICATED"
~ R. Drabek

Mathematics: Beauty and Beast

~ Anjali Joshi
B.Sc. (H) Mathematics, 2nd year

Mathematics is often described as the language of the universe, with its power to describe and explain the patterns in phenomena of our world. Yet, for many people mathematics is seen as an impenetrable daunting subject, filled with complex equations and abstract concepts. The truth is, Mathematics can be both a thing of beauty and a beast to be tamed.

On one hand, Mathematics is beautiful, and its the ability to reveal patterns in symmetry that exist all around us, from the spirals of a nautilus shell to the fractal patterns of a snowflake. These patterns are not just pleasing to the eye but also serve as the foundation of understanding the physical world. It provides a language for describing and analyzing the natural world, from the behavior of subatomic particles to the dynamics of the universe as a whole. Mathematical beauty lies in its ability to explain the seemingly unexplainable. Its beauty lies in its universality. Unlike language, which varies across cultures and regions Mathematics is a language that is understood by people all over the world.

One of the most exciting aspects of mathematics is its ability to connect seemingly disparate areas of study. From music to art, economics to physics, mathematics provides a common language for understanding the world in all its complexity. It allows us to explore the hidden patterns in relationships that underlie seemingly related phenomena, and to uncover new insights and discoveries in the process.

But perhaps the most important aspect of mathematics is its ability to inspire curiosity and wonder. It is a subject that challenges us to think deeply, ask difficult questions, and explore the unknown. It can be frustrating and challenging at times but it can also be incredibly rewarding leading to new discoveries and insights that can change the way we view the world.

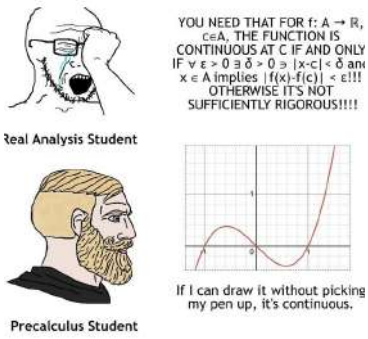
It's true that for many people mathematics can be a subject that is intermediate and difficult to approach. It is often referred to as a hidden beast. Part of the problem lies in the way that mathematics is often taught. Many students are taught to memorize formulas and procedures without truly understanding the underlying concepts. This can lead to a lack of engagement and a feeling that mathematics is nothing more than just a collection of arbitrary rules and procedures. It can be difficult to understand and requires a lot of hard work and practice to master. Many students struggle with the subject, finding it overwhelming and intimidating.

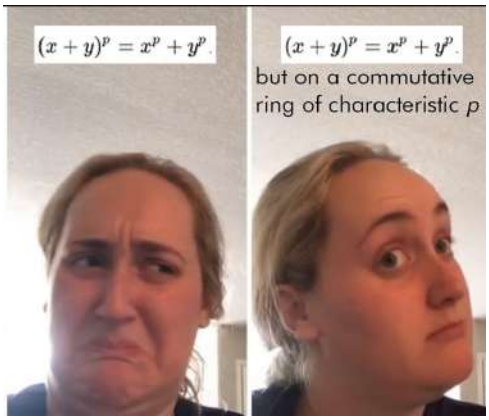
The beastly side of mathematics can also be seen in its use as a tool for solving practical problems such as calculating interest rates, designing bridges, or analyzing data. The sheer complexity of these tasks can make mathematics seem like an insurmountable beast. It requires discipline, focus, and the willingness to grapple with challenging concepts. The beauty of mathematics is often obscured by the frustration and difficulty of mastering it. Yet, like any skill, the more we practice and engage with mathematics the more we can appreciate its beauty.

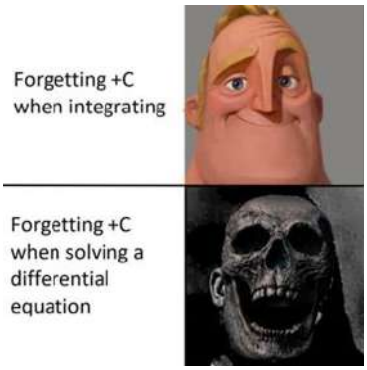
In Conclusion, mathematics is both a Beauty and the beast. Whether you are a student just starting out on your mathematical journey or a seasoned researcher exploring the cutting edge of the field, mathematics has something to offer everyone. The beauty and beast side of mathematics depends on our perspective and approach to the subject. By embracing the beauty of mathematics and overcoming its challenges, we can unlock the power of this fascinating subject and appreciate its importance in our lives.

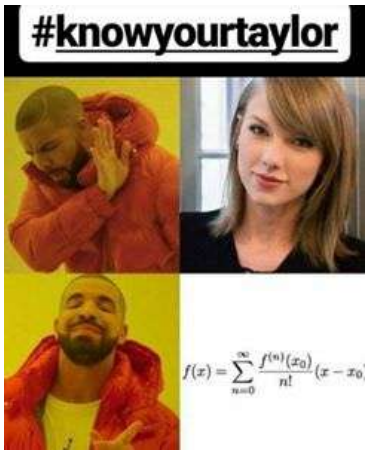
"MATHEMATICS REVEALS ITS SECRET TO ONLY THOSE WHO APPROACH IT, IT SHOWS ITSELF TO PATIENT FOLLOWERS."

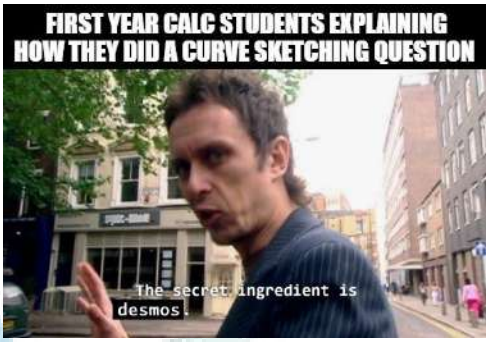
Cause jokes never made anybody less 'math-nerd'

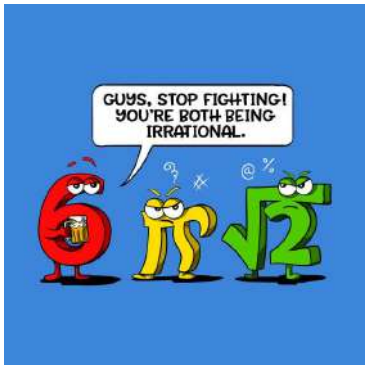












"AN EQUATION MEANS NOTHING TO ME UNLESS IT EXPRESSES A THOUGHT OF GOD"

~Srinivasa Ramanujan

The Divinity of a Mathematical Equation

~Saumya Solanki
B.Sc. (H) Mathematics, 2nd year

When we think of mathematics as a subject, we know, a lot of people find this subject nebulous and sporadic. It is speculated that mathematics is all about unfathomable equations and theories. But it is known by few that under the pyramid of arcane equations, there is an equation labeled as 'the most elegant equation' which is called Euler's Identity, e ^(iπ) + 1 = 0.

The beauty and divinity of this equation often remain under the cover of math-hate and people seldom get to pass through that. Richard Feymann, a famous physicist has regarded this equation as 'the jewel of mathematics' and 'the most remarkable mathematical equation'. The elegance of this equation is compared to Shakespearean sonnets. Just as a sonnet is a way of describing the beauty of literature, this equation describes the beauty of mathematical symbols and operations.

This equation is a blend of three mathematical operations namely exponential, addition, multiplication, and five constants. The constant π is the ratio of a circle's circumference to its diameter. The omnipresence of this immeasurable irrational number π, whose value is 3.14159....., appears almost everywhere from the figures inclusive of circles to the calculations exclusive of circles. The constant e, also known as Euler's constant (value= 2.718), forms the base of natural logarithms which are widely used in mathematical analysis representing exponential growth or shrinkage. The paradoxical existence of i , an uncanny and mysterious number existing on the periphery of real numbers. The numbers 1 and 0 are known by all as multiplicative and additive identities.

Talking about Euler, who is considered one of the most prolific mathematicians and physicists of all time.

He won the French Science academy's annual prize for devotedly working in the field of mathematics, science and technology for 12 times! Henri Poincare once called Euler the 'god of mathematics' He made several advances and mathematical developments such as number theory, calculus, geometry and probability. Euler suffered an infection that rendered him blinded in his right eye when he was in his 20s, then later a failed cataract operation left his left unable to see objects too. Despite losing his sight, this loss did not hinder his will to make discoveries in mathematics.

Euler's identity is a special and unique d unique case of Euler's formula,
$e^{i\pi} = \cos x + i \sin x$, where x is equal to π.

So if we replace x with π,
The equation becomes :

$e^{i\pi} = \cos\pi + i\sin\pi$
We know since $\cos\pi = -1$ and $\sin\pi = 0$;
Then the equation becomes:

$e^{i\pi} = -1$
$e^{i\pi} + 1 = 0$
This is our Euler's Identity.

This identity serves as a bridge between different areas of mathematics- complex numbers, trigonometric functions and exponential functions. It also has useful applications in the real life world as well; this was discovered long after the identity came to be known by the world. The general form of this identity is used predominantly in mathematical modelling of rhythmic flow of alternating current which keeps most of the electrical appliances alive. Many people will contemplate that this formula might become archaic by passing time but that's not the case; this is the fascinating thing about it. It will persist to be used in pursuant years by electrical engineers and it will continue to bewitch young mathematicians in the future.

Fun-O-Maths

The best way to learn is to try it out for yourself and the only way to know if it works. So what are you waiting for, sign up into Mathematica, type these codes and visualize the beauty of mathematics where each point and line is telling a beautiful story.

1. **Manipulate[Plot[a*x Cos[10/x], {x,-2,2}, PlotRange -> 2],{a,-2,2}]**

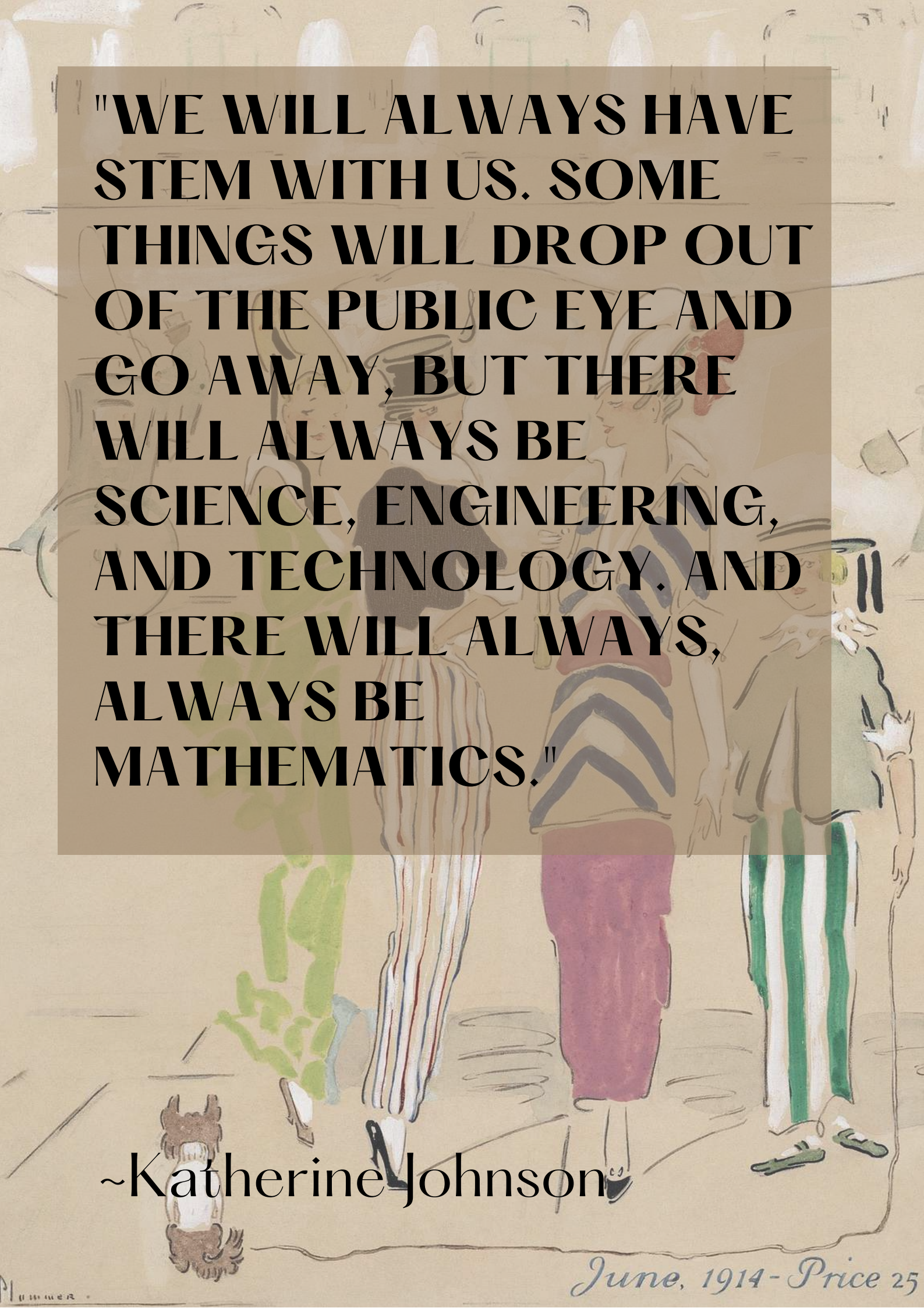
2.Plot[Table[n x^2, {n,-40,40}],{x,-2,2},PlotRange-> 50]

3.Plot3D[Sin[x Cos[y]],{x,-6,6},{y,-3,3},BoxRatios-> Automatic]

4.ContourPlot3D[x^2+ y^2+z^2=1,{x,-1,1},{y,-1,1},{z,-1,1}]

5.Graphics3D[{
Sphere[{0,0,0},3], Sphere[{0,0,4},2],
Sphere[{0,0,6.5},1],
{Lighter[Black],
Cylinder[{{0,0,7.5},{0,0.5,9}},0.8],
Cylinder[{{0,0,7.5},{0,0.03,7.6}},1.5],
Cylinder[{{2,0,4},{4,0,5}},0.2],
Cylinder[{{-2,0,4},{-4,0,5}},0.2]}},Boxed-> False, Lighting->"Neutral"]

Type it out and have fun playing with



"WE WILL ALWAYS HAVE STEM WITH US. SOME THINGS WILL DROP OUT OF THE PUBLIC EYE AND GO AWAY, BUT THERE WILL ALWAYS BE SCIENCE, ENGINEERING, AND TECHNOLOGY. AND THERE WILL ALWAYS, ALWAYS BE MATHEMATICS."

~Katherine Johnson

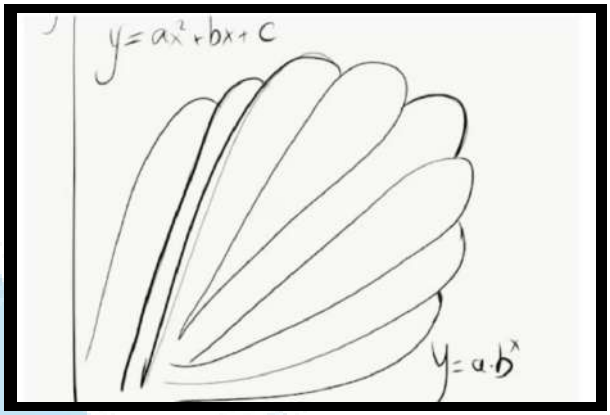
Can't spell style without STEM

~Niharika
B.Sc. (H) Mathematics, 3rd year

As someone who is more of a literature or a fashion enthusiast, if you ask me, I definitely feel alienated in all of my maths lectures. I've always felt like an outcast whenever my STEM mates would come up and discuss fascinating stuff like paradoxes, the universe, and whatnot. I, on the other hand, would have "Did you see that dress Gigi wore in the Versace Runway?"

This has been a common conflict for most of the STEM scholars who are art enthusiasts too. When asked to choose streams in schools, it becomes evident that either you can choose humanities or technology. We are conditioned to believe that there is no way art and tech can join hands. But if there is?

If mathematics and geometry can play a vital role in paintings, architecture, religion, lifestyle, etc., there definitely has to be a connection between mathematics and fashion. This was what I thought when I started exploring this idea. And to my surprise, there are a lot of ways where maths crawls slowly into the roots of fashion. From keeping track of finances to maintaining a stock of a certain item to knowing what symmetry would make a design pop out, Maths is so vital in the fashion industry.
The maths teacher Diarra Bousso Gueye also had the same curiosity when she used equations to graph and coral shell using software and ended up putting the design from that plotted graph(I mean how cool is that!).



Also, how can we forget when the pop star, Taylor Swift, used physics(of course the designers did, but can't help putting her name lol) to design a pair of heels which definitely defies the laws of nature (Fig 13, you get it if you get it). Absolutely slay!

Fig 13

Although it is true that to build a great design what matters most are your creative instincts. But that is not all that is required. Even in hand drafting, calculations are used extensively. Knowing what margins to leave at what places, what measures to keep in mind in case the garment shrinks, calculating the circumference of skirt and sometimes different skirts that might require different measurements - all this leaves us to one conclusion that you can't really spell style without STEM.

"ONE OF THE ENDLESSLY ALLURING ASPECTS OF MATHEMATICS IS THAT ITS THORNIEST PARADOXES HAVE A WAY OF BLOOMING INTO BEAUTIFUL THEORIES."

~Philip J. Davis

The Hidden Beauty of Mathematics

~Anshu
B.Sc. (H) Mathematics, 3rd year

Learning mathematics has made me realize the unsung contribution mathematics makes when it comes to providing us with reasoning and to better appreciate the beauty of nature. You can probably imagine my surprise when I realized that the fractal symmetry which I thought was solely a chemical concept; actually stemmed from mathematics. The Fibonacci sequence, which you may think exists only in the pages, is also visible in some of the nature's most exquisite structures. In this article, I would explain the beauty of mathematics in our surroundings.

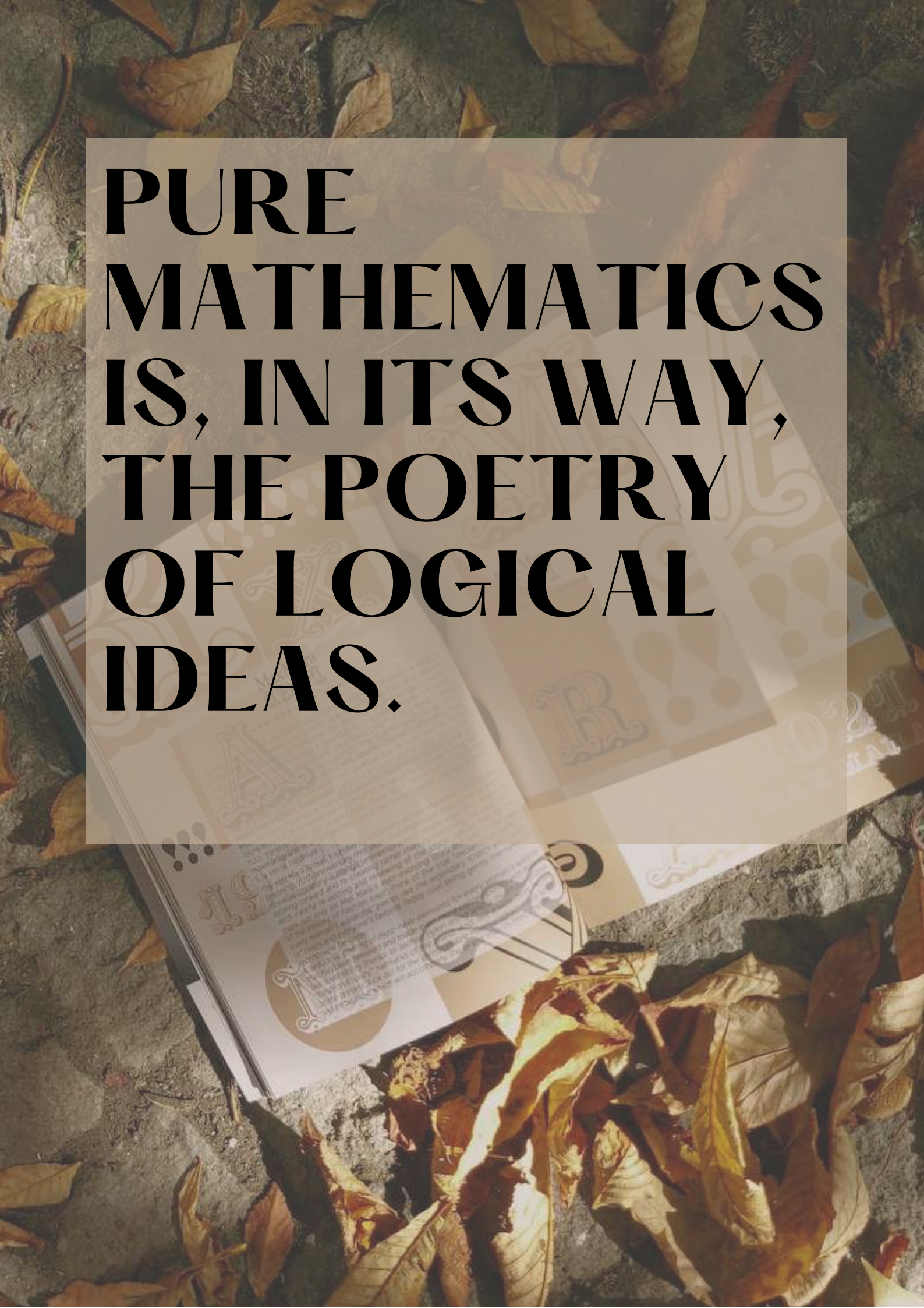
In fractal symmetry, one can find the same pattern within the pattern, which is why this can also be referred to as self-similarity. The best example to think of is a tree. The trunk of a tree separates into branches which then separate into smaller branches and then twigs, and these get smaller and smaller. In this way, we see repetition.
Another type of symmetry I wish to discuss is the so-called Wallpaper. This is the mathematical classification of a two-dimensional repetitive pattern inspired by honeycomb structures.

Besides being often seen in architecture and other arts such as textiles, this structure has found great use in the field of chemical catalysis.
One of the finest examples of the use of catalysis is in catalytic converters used to turn pollutant gases such as nitrogen oxides and carbon monoxide into nitrogen dioxide and carbon dioxide gases respectively, which are safer alternatives.

Fractal and wallpaper symmetry are the two types that we dealt with. However, this article would be incomplete without a nod to the spirals that are too often seen in nature. Some of these arise due to the golden ratio of 1.618[....] which is the most irrational number we can get. To put simply, it is the furthest way we can be from a fraction. In this way, the golden ratio gives the best spiral with no gaps.

Hence, flower petals and pinecones are guided by the golden ratio, which is related to the Fibonacci sequence where we get a value very close to the golden ratio. Petals and seeds find that the golden ratio offers the best packing with minimum gaps.

I find it amazing that a series of numbers on a paper can explain why many elements have chosen to adopt this particular configuration.


PURE MATHEMATICS IS, IN ITS WAY, THE POETRY OF LOGICAL IDEAS.

Women in Mathematics

~Diya Bedi
B.Sc.(H) Mathematics 3rd year

One day, when I was randomly ranting about Cauchy and how this mathematician is everywhere, calculus, algebra, discrete and what not branch of Mathematics. I wondered if there are any theorems, lemmas, even a symbol that's named after a female mathematician and my heart was ripped when I couldn't find any in one of my course books. "What is up with male and mathematics?", " Is it because both of these start with M?", " Why are there not many women in this field?" and even if there are "Why haven't we heard of them?". With these never ending bundle of questions, I went to the one and only buddy of our generation – Google. "OK Google, please show me the list of contributions of women in Mathematics". (Yes, I didn't want to type, I was low on energy as usual).

And here it was, few but prominent or probably there are some unsung heroes in this field as well, just lacking a little treasure hunt. Sophie Germain, was a French mathematician who wrote the Germain's Theorem and Sophie Identity Theorem. She has a major contribution in number theory. Due to the resistance of the society against her gender, she couldn't make her career but she worked independently throughout her life. Caroline Hershel, a German born astronomer, who studied spherical trigonometry that were used in solving one of the most complicated calculations of mathematics in astronomy. Her prominent works in discovery of new comets.

Everyone has heard of Charles Babbage and his inventions of computers but nobody has heard the name- Ada Lovelace. Babbage and Lovelace, together worked on the theoretical principles of the Analytical Engine. The machine couldn't be completed but it was designed in such a way to solve complex mathematics problems and make the work easier for all mathematicians. Ada Lovelace is also known as one of the earliest people who explored programming languages. Sofia Kovalevskaya, Alicia Boole Stott, Dorothy Smiley, Esther Klein,Emmy Nother, just a few to name.

I am not going to make your work easier though, this is your homework to read about them because why not? Let's get inspired and inspire. Interesting. Isn't it? How there are thousands and thousands of women out there, some known, some unknown, some overpowered and overshadowed by the patriarchy who love this very beautiful subject! How there are those well-known women, awarded and appreciated, who came out even when there was such a prejudice in STEM! I will stop wondering once I invent a theorem myself, I hope you wait for Diya's Best theorem.

MONOPOLY GAME

Kinjal, 2nd Year
B.Sc. (H) Mathematics, 2nd year

Now, here is a game for people interested in economy. The goal is simple: to remain able to resolve debts while forcing opponents into bankruptcy, by buying, trading and developing pieces of properties.

Initially, each player is given a fixed amount of money and the players are allowed to move around the board on the basis of the throw of dice. If the player lands on an unknown property, he may buy it but if he lands on a property owned by other player, he will have to pay rent to that player. The player is allowed to move around the board until he faces bankruptcy. That means you owe more that you can pay for the property you landed on. The bankrupted players are eliminated from the game and the last player standing wins the game. The players are paid salary once each round and can even land in jail during the game.

Concepts of game theory can be applied to decode the corporate behaviour regarding product pricing in monopoly and even global markets. Like this exciting game of Monopoly, concepts of game theories can be developed through various games like: Cooperative and non-cooperative games, constant sum, zero sum and non-zero sum games etc.

"THE HARMONY OF THE WORLD IS MADE MANIFEST IN FORM AND NUMBER, AND THE HEART AND SOUL AND ALL THE POETRY OF NATURAL PHILOSOPHY ARE EMBODIED IN THE CONCEPT OF MATHEMATICAL BEAUTY."

~D'Arcy Wentworth Thompson

Constructions of beauty and purpose

~Kinjal
B.Sc. (H) Mathematics, 2nd year

While preparing for a competition, I came across the treasure of the constructions of chittis or the fire altars which were used for yajnas. They were actually platforms on which yajnas were performed and they came up in different sizes and shapes. Here are some of the examples of the chittis:

- Sheyana chithi in the shape of a falcon
- Rathachakra chithi in the shape of a wheel
- Kurma chitti in the shape of a turtle

These altars were made up of layers and the number of layers depended upon the type of alters to be made and their purposes. Also, the construction units were the baked bricks cut into different geometrical shapes. Each layer of the chitti had different orientations of the building blocks. All this had to be implemented with exact ratios and dimensions.

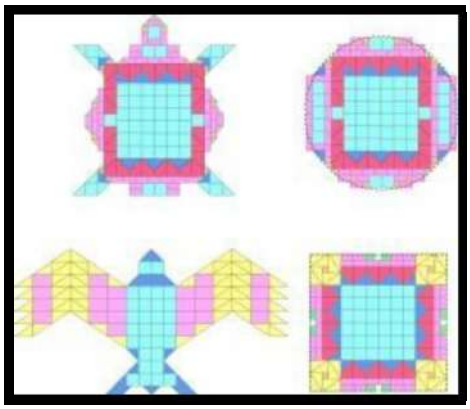
Taking the example of the Sheyana chittis, It was made up of 1000 bricks and 5 layers, each made up of 200 bricks. Alternative layers were of the same brick orientation.

A much wider scope of research in the same field made me stumble upon the different shapes of havan kunds. These havan kunds were mainly performed in the homes and similar to the chittis, these havan kunds had different shapes for different intents and purposes. For examples:

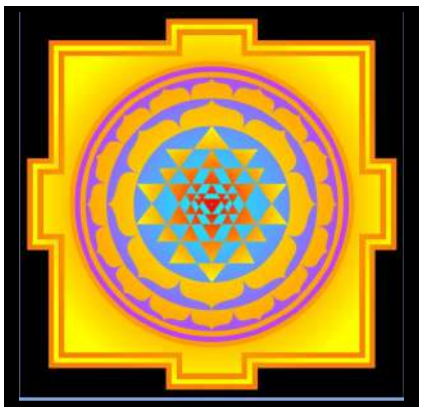
- A lotus shaped havan kund was for attracting wealth
- A triangular shaped havan kund was for defeating the enemies
- A six angled havan kund for long life
- A circular havan kund for harmony

Similarly go the geometrical yantras mentioned in the scriptures like sulba sutras. These mini architecture pieces make one wonder how different shapes in completely different layouts and number of building blocks produce the desired and particular spiritual effects. Researchers believe that different shapes resulted into production of different energy fields.There is definitely some relation between the geometry and the effects produced or, in broader sense, the mathematics and the spirituality.

The beauty and mystery lies here, yet to be discovered.



The SRI YANTRA by
SharkD(Michael Horvath)



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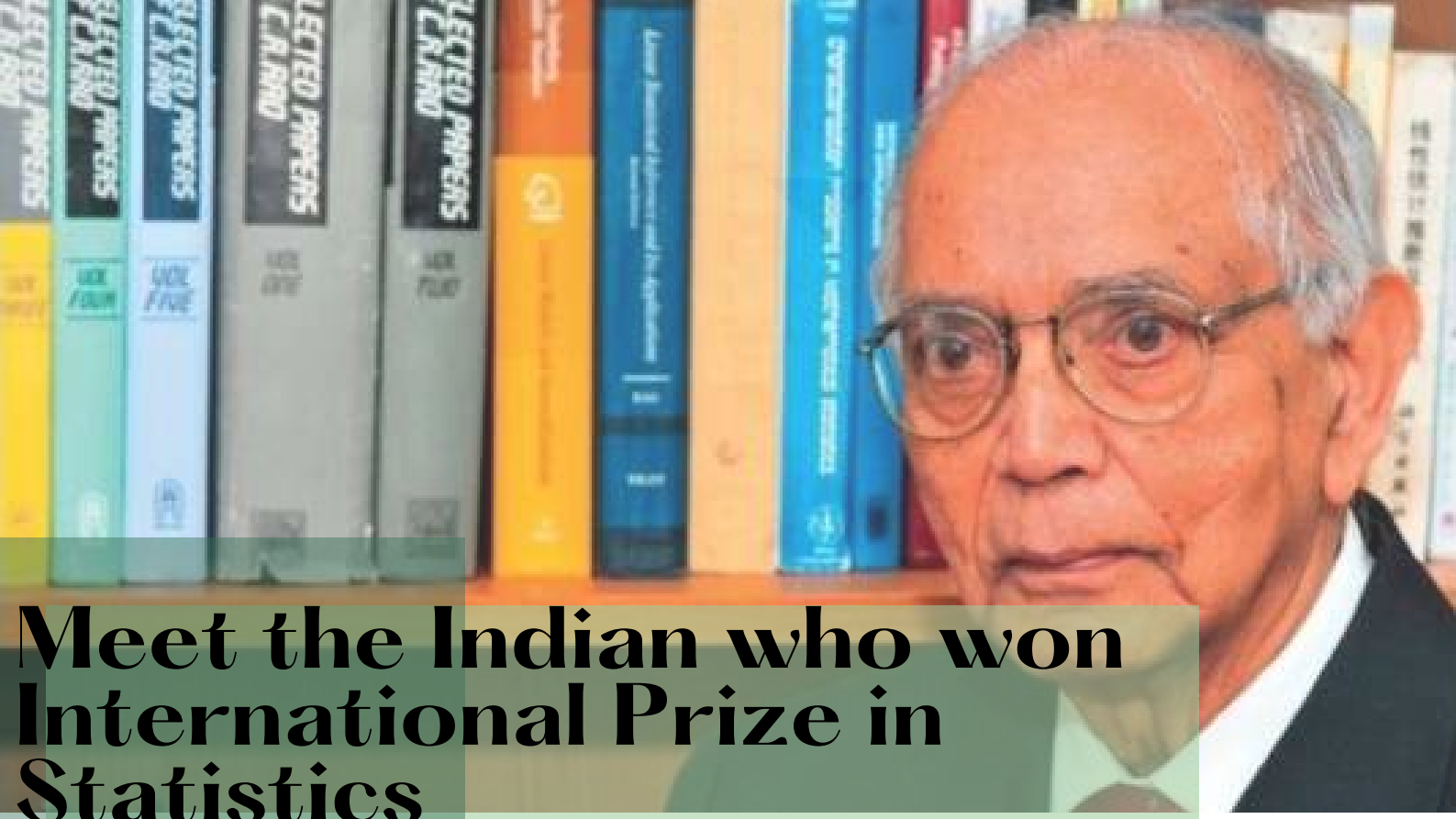


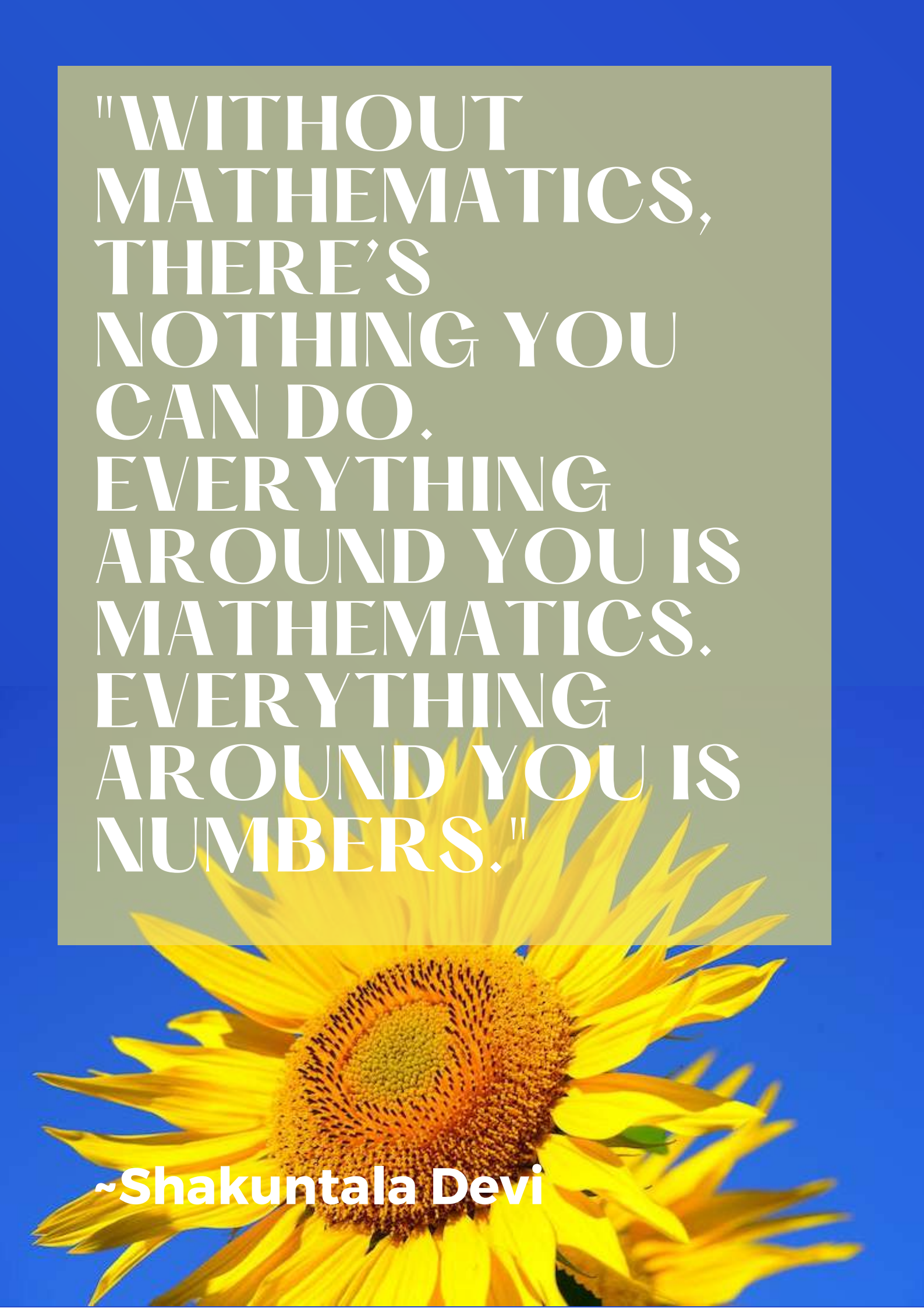
Meet the Indian who won International Prize in Statistics

~Saumya Solanki
B.Sc.(H) Mathematics 2nd year

Meet 102 years old Indian-American, C. R. Rao who has revolutionized statistics has been awarded the 2023 International Prize in Statistics with $80,000 award at biennial International Statistical Institute World Statistics Congress in Ottawa, Ontario, Canada. A proud and inspiring moment for all young mathematicians out there. Calyampudi Radhakrishna Rao better known as CR Rao is a celebrated mathematician and statistician known for his groundbreaking contributions in the field of statistics. For which he will be receiving the award equivalent to the Nobel Prize in the field. Rao was born in 1920 in Karnataka, India. He completed his master's degree in mathematics from Andhra University and then went to Calcutta University to obtain an MA in statistics. After that he went on to pursue a PhD degree from the UK. He also had earned a degree in DSc from King's College at Cambridge University. According to the article published in Indian Express, Rao is currently a professor emeritus at Pennsylvania State University at Buffalo. In 1968 he was awarded the title of Padma Bhushan and in 2001 the title of Padma Vibhushan and likewise he has been the recipient of several accolades.

Source : Indian Express and Times of India

"WITHOUT MATHEMATICS, THERE'S NOTHING YOU CAN DO. EVERYTHING AROUND YOU IS MATHEMATICS. EVERYTHING AROUND YOU IS NUMBERS."



~Shakuntala Devi

She is there in every core

~Bhumika Soni
B.Sc. (H) Mathematics, 2nd year

Maths is the end and start of life
Give me a pen and paper and I can prove it to you right
Grace around, I see shapes and I see numbers
I used to wonder how it was made and how it came
A scholar of mathematics introduce myself
Probability is my friend in every step of take
Symmetry and problems fascinate me to the core
Solving these numbers, is what which bring me to the sore
Heavenly celestial, far away from humanity
Light year of distance and gigantic figures calculated by the mother maths
Held by her and feed by her, everything starts and end from her
So bright her mighty, she can measure by trigonometry things greater than her
Mother of all subjects, we can find its essence in every scope
Geometry is a backbone, Arithmetic is soul
Physics is her favourite son and chemistry is her loveliest daughter. She beholds Many more and many more, SHE IS THERE IN EVERY CORE.

Math-hunter

RIDDLE CORNER FOR THE 'WILD'

1.You have a calculator that can display ten digits. How many different ten digit numbers can you type using the 0-9 keys once each and moving from one keypress to the next using the knight's move in chess?[In chess, the knight moves in an L shape: one square up and two across, two square down and one across, two square up and one across and other combinations.]

2.If there are 4 apples and you take away 3, how many do you have?

3. What is the maximum possible number of times you can subtract number 5 from number 25?

4. How many bricks does it take to complete a building made of brick?

5. Which month has 28 days?

6. What can you put between a 7 and 8 so that the result is greater than 7 but less than 8?

7. How can you make the following equation true by drawing only one straight line: 5+5+5=550

Solutions-
1.You can form the numbers 50349 27618 and 503 8167 294. You can also form their reverses. Hence 4 differentt numbers can be made. The key point is to realise that the number must start or end on the 5 key followed by or preceded by zero key otherwise there is no way of using all 10 keys during the route.
2. 3 apples
3. only once is because when you subtract 5 from 25, it becomes number 20 then 15 etc.
4.only one- the last one
5. All of them
6. A decimal because 7.8 is greater than 7, but less than 8.
7. There are two ways to do so:
- Draw a line on the first plus sign to turn it into a 4
- Change the equal symbol to a crossed out equal symbol which means "not equal to".

"GREAT THINGS ARE DONE BY A SERIES OF SMALL THINGS BROUGHT TOGETHER..."

~Vincent Van Gogh

How imaginary numbers were invented and their uses

~Drishti Singh
B.Sc. (H) Mathematics, 2nd year

What we see today in any mathematics textbook of 11th grade today, was something once that not even the greatest in the mathematics' community could accept and improve upon. What started out as a stub in the Ars Magna by Gerolamo Cardano, now finds itself deep-rooted in one of the most fundamental equations in modern physics.
Imaginary numbers first appeared in print in 1545 in Ars Magna by Cardano, who found these numbers while working out a particular cubic equation. The problem mentioned by Cardano which leads to square roots of negative numbers is: find two numbers whose sum is equal to 10 and whose product is equal to 40. The answer is 5 + √−15 and 5 − √−15. Cardano called this "sophistic," because he saw no physical meaning to it, but boldly wrote "nevertheless we will operate" and formally calculated that their product does indeed equal 40. Cardano then says that this answer is "as subtle as it is useless". It was actually Rene Descartes, famous mathematician and philosopher, who coined the term imaginary:

> ***"For any equation one can imagine as many roots [as its degree would suggest], but in many cases no quantity exists which corresponds to what one imagines."***

However, it wasn't until Gauss and Euler that the use of imaginary and complex numbers within the mathematics community found its widespread application.
L. Euler (1707-1783) introduced the notation i = √−1, and visualised complex numbers as points with rectangular coordinates, but did not give a satisfactory foundation for complex numbers. Euler used the formula x + iy = r (cos θ + i sin θ), and visualised the roots of zn = 1 as vertices of a regular polygon. He defined the complex exponential, and proved the identity eiθ = cos θ + i sin θ.

Gauss (1777-1855) was the one who really established the foundation of complex numbers. In his landmark work "Disquisitiones Arithmeticae," Gauss proved the fundamental theorem of algebra which states that any non-constant polynomial with complex coefficients has at

least one complex root. This was a major breakthrough in mathematics, as it helped establish the legitimacy of imaginary and complex numbers in solving real-world problemis.

To elaborate further, imaginary numbers were initially seen as strange and non-physical, as they had no real-world application or representation. However, as mathematics progressed and complex problems began to arise, these numbers became increasingly useful in solving problems that were previously impossible to tackle.

One example of the usefulness of imaginary numbers can be found in the study of electrical engineering. Engineers use complex numbers to represent the magnitude and phase of electrical signals in AC circuits, allowing them to analyse and design circuits with greater precision and accuracy. Similarly, imaginary numbers are also used in signal processing to analyse audio and video signals, and in quantum mechanics to describe the behaviour of subatomic particles.

Complex numbers, including imaginary numbers, have found widespread application in many fields of mathematics, physics, engineering, and other sciences. For example, they are essential in solving differential equations, signal processing, quantum mechanics, and electrical engineering, among others.

Fluid Dynamics: In fluid dynamics, imaginary numbers are used to represent the phase shift between pressure and velocity waves in a fluid. This helps engineers design better engines, turbines, and other fluid-based systems that can operate more efficiently and smoothly.

Music: In music, imaginary numbers are used to represent the frequency and amplitude of sound waves. Musicians and audio engineers use complex numbers to analyse and manipulate sound waves, allowing them to create better-sounding music and audio recordings.

Economics: In economics, imaginary numbers are used to represent the complex roots of a quadratic equation. This helps economists analyse the behaviour of complex economic systems, such as stock markets, and predict future trends.

Cryptography: In cryptography, imaginary numbers are used to encrypt and decrypt messages using complex mathematical algorithms. This helps keep sensitive data and communications secure from hackers and other malicious actors.

Computer Graphics: In computer graphics, imaginary numbers are used to represent the position and orientation of objects in a 3D space. This helps animators and designers create more realistic and lifelike computer-generated imagery.

In conclusion, imaginary numbers were first discovered by Gerolamo Cardano while working on a cubic equation, but their true value and legitimacy were established by mathematicians such as Euler and Gauss. Despite their initial scepticism, these numbers have found a prominent place in modern mathematics and science, and have proven to be an indispensable tool in solving complex problems. It just goes to show that even the smallest and seemingly insignificant discoveries can have a major impact on the world.

"MATHEMATICS AND ROBOTICS WHAT A PERFECT PAIR, TOGETHER THEY CREATE MACHINES BEYOND COMPARE"

Mathematics behind Robotics

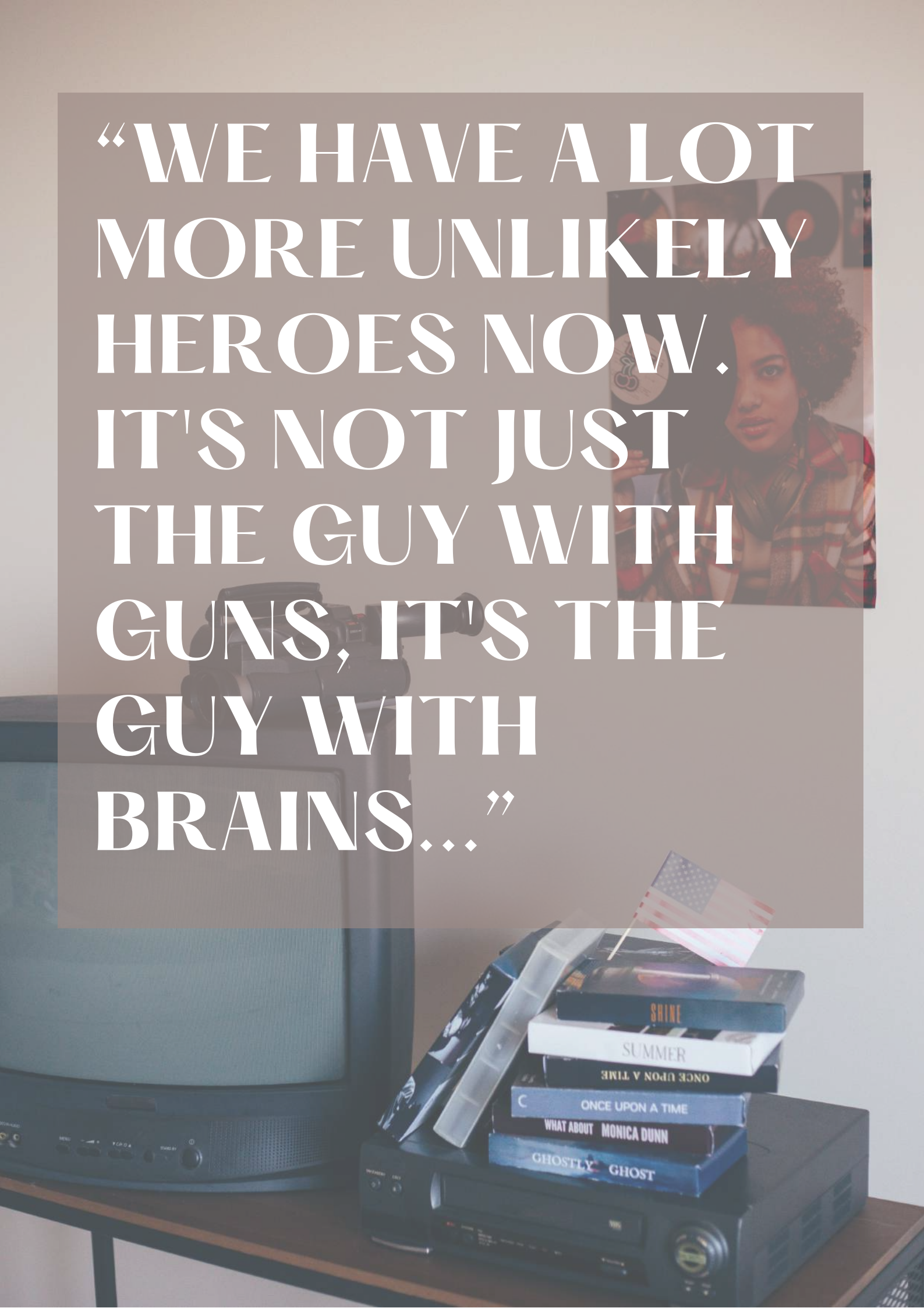
~Anjali Joshi
B.Sc. (H) Mathematics, 2nd year

Truly said, mathematics is the foundation of robotics, and robotics is the future of mathematics. Today we are living in a world where the use of technology is accelerating, transforming our lives at an unprecedented rate. It is changing the way we live, work, and interact with each other at a breathtaking pace. Amidst of this we cannot deny the emergence of robotics and AI. Robotics technology has advanced significantly in recent years and robots are being used in various industries, such as manufacturing, healthcare, agriculture and logistics. From protecting the world as in sci-fi movies to bringing a lot of destruction, from self-driving cars to robotics pets.Robots and machines have never failed to fascinate us. As robotics technology continues to advance, we can expect to see more applications in our present and future lives. Here, we cannot deny the insurmountable support of mathematics behind robotics. In the world of robotics, mathematics is the bridge between imagination and reality.The field of robotics heavily relies on mathematical concepts and principles.In computer vision maths algorithms extract features that enable robots to see and interpret their surroundings with pleasure.

Mathematics is essential for designing and programming robots to perform complex tasks. For example, kinematics is a branch of mathematics that deals with the motion of objects and is used to model the movement of robot joints and end-effectors. Linear algebra is used for calculating the transformation between different coordinate systems and the manipulation of robot poses. Probability and statistics are also important for designing and implementing algorithms for perception, control, and decision-making in robotics.

Another example is the use of control theory, which is a branch of mathematics that deals with behaviour of dynamical systems. In robotics, control theory is used to design feedback control systems that enable a robot to achieve a desired behaviour. Mathematics is also used in computer vision which is the field of robotics that deals with the interpretation of visual data from cameras or sensors. In computer vision mathematical algorithms are used to extract features from images, such as edges or corners, which can be used to determine the location and orientation of objects in the environment.

Robotics is the field of engineering and Computer science which deals with the design, construction and operation while mathematics provides the language and tools necessary to make sense of the physical world.
If mathematics is the language of nature then robotics is the application of that language. It is the foundation of robotics. Robotics, that is the future of mathematics. They both are like two wings of a bird working together to unlock the full potential of each other. The continued integration of mathematics and robotics will continue to push the boundaries of what robots can achieve and what the human brain can perceive.


“WE HAVE A LOT MORE UNLIKELY HEROES NOW. IT'S NOT JUST THE GUY WITH GUNS, IT'S THE GUY WITH BRAINS...”
SHINE
SUMMER
ONCE UPON A TIME
WHAT ABOUT MONICA DUNN
GHOSTLY GHOST

The Imitation Game (Movie Review)

~Saumya Solanki
B.Sc. (H) Mathematics, 2nd year

Sometimes college life can be full of monotonous and mundane activities. Assignments, tests, practicals, internals they all leave us drained. And to dispel your boredom, I'm here with an engrossing movie recommendation that will definitely take you on a roller coaster ride. Released in 2014, based on a true story of a not-so-known and yet-so-important mathematician and AI pioneer Alan Turing, who is on his quest of breaking the code of an enigma machine, is such a delightfully beautiful but devastatingly sad movie to watch. The best part about this movie is that not just it will take you into the whole deciphering experience that any person will find enthralling but also the whole story waived around the time of World War II, so history enthusiasts will also love it.

'The Imitation Game', directed by Morten Tyldum and Graham Moore, starring Benedict Cumberbatch and Keira Knightley is loosely bound on the 1983 biography Alan Turing: The Enigma by Andrew Hodges and has received various accolades. The movie has three timelines to follow. One follows the time of 1951(the present), one follows the time when Turing was working on breaking the code of enigma and the third timeline depicts the childhood of Turing. So the story opens up during the time of 1951, when two policemen come to investigate Turing's house after a break-in occurs. So here the story starts, with Turing telling these policemen about the time when he worked at Bletchley Park during world war II.

When World War II starts in 1939, Turing travels to Bletchley Park, where he joins the cryptography team with Hugh Alexander, John Cairncross, Peter Hilton, Keith Furman, and Charles Richards. The team is trying to analyze the Enigma machine, which the Nazis use to send coded messages.

And this was the reason Germans were winning at this point, as they used to change the code of the enigma machine everyday. Turing had this hunch that only a machine can defeat another machine. So he went on to create a team which will assist him in developing a machine that will crack enigma as he hoped. He is joined by a cambridge graduate Joan Clarke (played by Keira Knightley) , who with her robust crossword-solving skills helps Turing reach his goal. There are times when Turing feels defeated and things fall out of place for them but he nevers accepts his defeat until he succeeds. And believe me when i say i literally got goosebumps when this sentence came up that too at the time when it was most needed," Sometimes it is the people no one imagines anything of, who does the things that no one can imagine." It is one of the most motivational lines I've heard. And in the end they actually succeed in their mission of decoding the enigma.

The tale just doesn't end here, In 1952, he is convicted of indecency and he undergoes chemical castration in lieu of jail. There is a huge plot twist as to why he was subjected to all this and what happens after that. Which you guys can only find out after watching the movie (don't want to give you all spoilers 😆). This movie is not just a thriller or entertainer but rather the achievement and hard work of Alan Turing along with the team who saved the lives of numerous people. This is so motivating and definitely one of the best films that describe the mathematician Alan Turing.

Other movie recommendations

- **A beautiful mind**
- **The man who knew infinity**
- **Shakuntala Devi**

Banach Tarski Paradox

~Drishti Singh
B.Sc. (H) Mathematics, 2nd year

In our daily life, we come across a lot of unbelievable things which seem to be beyond reality. We can't even imagine that this could even exist, but that's the magic of nature; and it keeps on fascinating and making us curious to fraternise more.
As these amazing things are categorised into different branches of what seems to be the unfathomable at first, but really transforms into what might give you the little joys in life. One of the little joys can be the "Banach Tarski Paradox" in modern mathematics, which is a remarkable result in set theoretic geometry that shows the limitations of our intuitive understanding of size and measure.

To understand the Banach Tarski Paradox, we need to delve into the mathematics of sets and measure. In mathematics, a set is a collection of objects, and we can define a measure on a set to assign it a size or volume. For example, the measure of a solid ball in three-dimensional space is its volume, which we can calculate using calculus. However, when we deal with sets that are infinitely complex, our usual methods of measuring size can fail.
But, according to the paradox; given a solid ball in three-dimensional space, there exists a decomposition of the ball into a finite number of disjoint subsets, which can then be put back together in a different way to yield two identical copies of the original ball. Indeed, the reassembly process involves only moving the pieces around and rotating them without changing their shape. However, the pieces themselves are not "solids" in the usual sense, but infinite scatterings of points that can be rearranged in a way that preserves their relative distances and angles.

This paradox arises from the always confusing concept/word in mathematics, i.e., infinity. The Paradox is a striking example of how infinity can challenge our intuition about space and size. It shows that our notions of volume and measure can break down when we deal with objects that are infinitely divisible. In fact, the paradox can be seen as a consequence of the fact that in set theory, there are different types of infinity, and some infinities are larger than others.

Infinity surely feels like a number, but it doesn't behave like one. Growing up we got to know a lot about the 'infinity', and one thing is for sure that it's perplexing yet engrossing at the same time. Adding or subtracting anything from infinity, the result comes out to be infinity only. There can be infinite numbers in the set of real numbers ranging from 1,2,3,..... so on and also there can be infinite rational numbers between the natural numbers 1 and 2. This is how infinity can be beautiful yet confusing.

In conclusion, the Banach Tarski Paradox is a remarkable result in modern mathematics that demonstrates the strange and fascinating properties of infinity. It shows us that the infinite can be both beautiful and confusing, and that our intuitive understanding of space and size may not always be reliable when dealing with infinitely complex objects. As such, the paradox continues to intrigue mathematicians and philosophers alike and reminds us of the endless mysteries and wonders of the universe we inhabit.

"BEYOND THE BEAUTY, BEYOND THE NUMBERS; THERE LIES UNBELIEVABLE WONDER.
BEYOND THE STATISTICS, BEYOND THE STRUCTURES; MAKING ONE'S SOUL TO THUNDER.

~Prerna Panghal

Driven By Fascination

~Prerna Panghal
B.Sc. (H) Mathematics, 3rd year

To see the pure unrevealed charm of mathematics, one has to go beyond one's imagination. It's neither the diagrams observed in nature nor the historically built proportional configurations. Mathematics forms the building blocks of our innate world and can be seen in stunning ways. Whether it's the Fibonacci order followed by the petals of flowers or the tessellation of hexagonal snowflakes. Each corner of our eye is always caught up with one or the other such phenomenon. However, one manifestation still waits to be cherished under the folds of symmetry, geometry and mystery. An entity of "self-similar" and elaboration, widely known as fractals.

Fractals are another intriguing mathematical shape that we see in nature but go unrecognized. A concept meaning the same basic shape is seen again and again in the shape itself. Ranging from the branching of neurons in our brains to the leaves of ferns, they fantasize about several elements of our realm. Therefore, establish the basis of every living being.

On a broader aspect, it isn't one of the laws of nature that need to be addressed for learning but a discovery for healing. Research has shown that exposure to specifically fractal patterns can reduce stress levels by up to 60%. The fractals patterns are hyper-efficient in their construction which allows plants to maximize their exposure to sunlight and the efficient transport of nutrients throughout their cellular structure. The concept even works as a key element for understanding as well as studying the bends of various solar systems of the universe.
The growth of fractal patterns has always been one of the hidden faces of mathematics that exists everywhere and waiting to be explored.
Even before human civilization, it has added wonders to this wonderful world and continues to do so.

The Legend of Pi

~Drishti Singh
B.Sc. (H) Mathematics, 2nd year

The legend of Pi is a few millennia old
to define such a constant was a step so bold
take a circle put its circumference in the numerator
then you put its diameter in the denominator

it was known throughout Egypt and Greece
where the first to get its true value was the Archimedes
He used the method of polygons to approximate pi
which became the method that everyone would try

And India was not for behind in this intellectual race
She used the infinite series to settle this magnanimous case
But lo, and behold, Newton use the Binomial Theorem
And made use of Calculus to settle the doubt for 'em

Today we have computers to run calculations dry
And this is how humanity knows the million digits of Pi

Alumni Comments

We interviewed some of the seniors to know what they think about the theme of the magazine and what they have to share with their lovely juniors. Read further to know what they said:

Q. What are some of your "college experiences" you had nowhere else?

A. “The time I was a part of the department union and the union of Anubhuti: The Hindi creative writing society, I gained exposure and the kind of experience I couldn't have got anywhere else. I got to work with the best teams, faced obstacles, solved problems, overcame my fears, and got the opportunity to work on myself to be a better version of myself.Don't just be a studious kid, but also have fun along with your studies. The day you achieve the balance, you'll realize it's not always about sacrificing fun for good marks. Try and audition for various societies, selection doesn't matter, but it's the experience you gain. All the Best for your journey! There's a lot in store for you, just keep trying and don't give up.”

-Payal, Batch of 2022

A. “The freedom and being independent is in itself was a new experience that prompted me to learn and explore a variety of things. During this journey, there were mistakes and many successes. But most importantly, I have learnt to be empowered and also empower others too”.

-Malavika, Batch of 2022

Q. What made you do what you're doing right now?

A.” My interest and passion towards Computers, Data, Analysis, etc. made me choose Operational Research as a field of study for Masters. It wasn't an easy task to get to know what actually are my interests, but it was with time that I explored different fields and finalized what I wanted to do.”

-Payal, Batch of 2022

A.”Well, pursuing a master's is not an easy decision to come up with as while pursuing a bachelor's. We being young minds, want to do something with the knowledge we have gained so far by say looking for a placement or a startup and exploring further and also pursuing further studies in the subject you have studied somehow puts you in a more responsible place and scope of mistakes are somewhere left out.

The pull towards mathematics was the key factor that pushed me to pursue further studies and that should be for everyone, as without interest you cannot enjoy the beauty of a subject to full. Also after pursuing MSc, many more opportunities are opened to us say lectureship, research, subject analysis, and many more.”

-Snehal, Batch of 2022

Q. How to know if you're fit for academics or for other creative fields?
A. “Explore and Learn. That's the best way to find what you're good at and what are your areas of interest. It's never too late to get to know about yourself. If you're having a hard time studying, try and explore different fields, you might turn out to be another John Waters, you never know!”
-Payal, Batch of 2022

A.”I believe by the beginning of your semester 6, you would formed some plans of your own about what to pursue further. But if you are still confused or are completely clueless, then I guess you can talk to your seniors to better understand different opportunities. You can approach your teachers too who can give a good overview of your academic expertise. Most easiest of it all is prioritising what you want, what you like and what you enjoy and it is okay if you are deviating from academics all together too.”
-Malavika, Batch of 2022

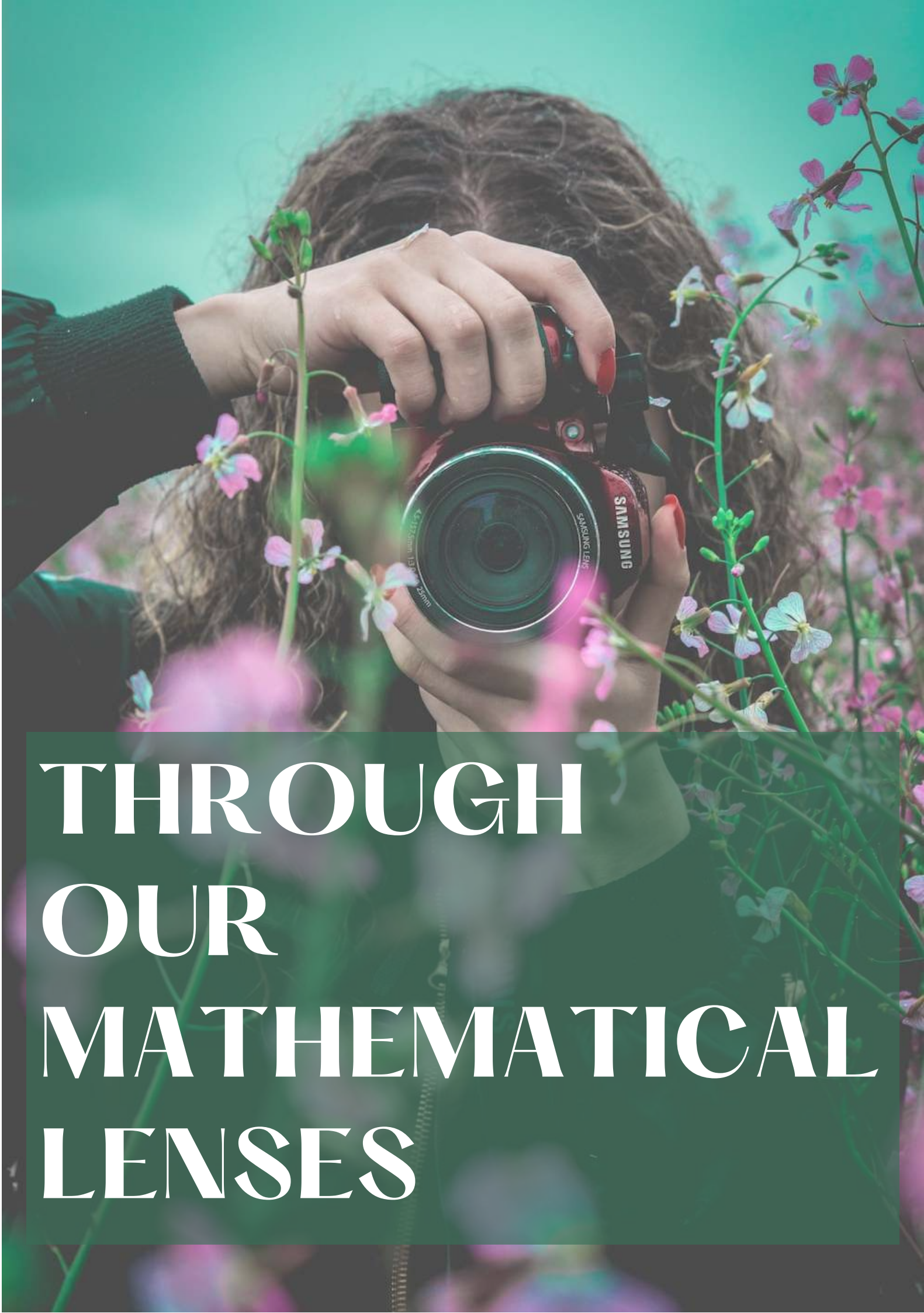
A.”That would come with experimenting. Make the best use of all your opportunities at college and participate in extra-curricular activities like dance, painting, creative writing, paper presentation. Don't ever confide yourself to any particular thing. Challenge yourself to try new things and take interest in different fields, push your limits. Be it any field, if you are really passionate about it then leave no stone unturned to dive deeper into it. “
-Rushda, Batch of 2022

Q.How was life after college like?
A.“A bit busy since entrance exams were on its way.
Also we left an integral friendships in college and obviously entrance journey is not at all easy so sometimes anger and loneliness also hits hard. But yeah that's an important phase to go through.”
-Sejal, Batch of 2022

Q. What do you think are some must-have skills for mathematics people that can set them apart from others?
“a) Peculiarity- Start questioning what you see in your books and try to find the reason behind it. This particular subject has answers to them all.
b) Perseverance- Maths can be sometimes boring and tough. But what keeps you going is your will to do it. Try, try and keep trying until you do it.
c) Passion- You should have interest in mathematics and try to make it simpler in order to learn it efficiently.”
-Rushda, Batch of 2022

“You should always be excited about your subject.
Passion for the choosen subject.
Learning should be your priority.
Ability to think and work Rigoursly.
Most important learing from failure is a must”
-Sejal, Batch of 2022

Batch 2023



THROUGH OUR MATHEMATICAL LENSES

Mathema event log

1. MATHRON – The Mathematics Marathon (a quiz competition related to mathematics and calculations)

Description: The quiz competition MATHARON was organised on 28th September,2022 by MATHEMA. The quiz involved questions related to mathematics and was open to the students of the mathematics department.

2. IN THE WOODS OF WORDS

Description: The event took place on 30th September in the ECA break in front of Audi foyer where the participants were asked to write their story and experiences related to mathematics on sticky notes and using art etc., These were then put on notice board with heading 'Maths ke kisse'.

3. DEPARTMENT ORIENTATION FOR 1st YEARS

Description: The orientation was organised for the first-year students on 2nd November 2022 in an offline mode. The gathering was addressed by Ms. Arshmeet Kaur introducing all of them to the department teachers and encouraging them for the exciting journey ahead. The orientation was followed by explaining to them the new changes in the course structure, timetable etc.

4. LECTURE ON CONTINUITY AND UNIFORM CONTINUITY BY PROFESSOR AJAY KUMAR

Description: A lecture was organized by the department on continuity and uniform continuity. The speaker for the lecture was Professor Ajay Kumar, a NASI senior scientist who has delivered more than 100 invited talks at different Universities and institutes internationally. The lecture was commenced by Ms. Arshmeet Kaur, welcoming the speaker followed by the lecture which focused on analysis and application of the topic in the real world.

5. REELMATICS:REEL MAKING COMPETITION

A reel making competition was organised by Mathema. The participants were asked to make a reel on either of the themes:
1)Transition from online to offline
2)How a Maths student sees the world

6. ARTICLE WRITING COMPETITION

Description: An online article writing competition was organised on 10th January, 2023 on the theme
1. Linear Algebra is said to be the most theoretical mathematics. Do you think there are any practical uses of the subject in the real world?
2. Chess and checkers- the use of mathematics in recreational activities.
The competition was inter college and Mansi(1st year, Gargi college), Mohsin Imam (3rd year, ARSD) and Palak(1st year, KMC) bagged 1st, 2nd and 3rd positions respectively.

7. PHOTOGRAPHY COMPETITION

Description: An online photography competition was held on 14th January, 2023 on the theme 'Mirage'. The 1st, 2nd and 3rd positions were respectively bagged by Nandini Shah, Payal Makhija and Chhavi.

8. CAREER COUNSELING SESSION ON DATA SCIENCE

Description: A career counselling session on data science was organised by the department. The speaker Anubhav Srivastava emphasised on the career prospects and the know-how of the data science field.

9. MEET AND GREET WITH THE FRESHERS

Description: An interactive session with the freshers was organised on the theme 'Kdrama'. The event was held to make them familiar with the events that the department organises and encourage them to take part in those events.

10. MEET AND GREET BETWEEN 2nd and 3rd YEARS

Description: A fun and enriching informal meet was organised between 2nd and 3rd years on the theme 'Wednesday'. The event was held to make 2nd and 3rd years familiar with each other so they get to know each other well.

11. LEARNING PYTHON WORKSHOP

Description: A two-day workshop was organised by Mathema on 15th and 16th March, 2023 on learning Python. The resource person Dr. Jeya Gera, Department of Computer Science, Shyama Prashad Mukherjee College, University of Delhi explained to students from very scratch of how-to start with python to explaining the relevance of language in corporate these days.

12. MILLENIA: A QUIZ THAT TAKES YOU BACK TO THE GOOD OLD DAYS

A thrilling quiz competition-Millenia under Scintillations'23 was organised by Mathema. The event took place on 28th March '23. Exciting prizes and certificates were given to the the winners.

13. IDENTITY

A best-out-of-waste dress making competition was organised by Mathema under Scintillations'23. The event took place on 29th March '23. Exciting prizes and certificates were given to the the winners.

Student's Union 2022-23

The whole year with the association has been full of overwhelming-series-of-events. But I'm glad, we were able to put all our differences, personal and professional, aside to work together as a team and make everything, from events to finally this magazine, a grand success. I'm so grateful for so many people more than they know, who believed in themselves as well as me.

~ Niharika, Editorial Head

I'm immersed with joy and happiness on completing my journey with our family of Mathema. It was such an overwhelming experience for me to work, that couldn't be just described on paper. I learned so much from every member of Mathema, which surely, is going to help me in the future. I want to say thank you to everybody out there, for making me feel at home.

~ Drishti, Editorial Co-Head

My journey with the union this year was a rollercoaster ride. There were times when everyone was panicking, times when we were laughing without a reason, and times when we were extremely dedicated and working at our maximum productivity. This was an extraordinary journey that has made me a bolder and better version of myself.

~ Anushka Raghav, President

My time at Mathema was full of ups and downs, but looking back, I am filled with gratitude for everything Mathema and my wonderful colleagues have given me.

~ Tareeshi Mittal, Vice President

Being a part of Mathema was the best part of my college journey. The stress and last-minute breakdowns were all worth it. The memories we have made are the ones I'll cherish forever.

~ Tashu Panwar, Union Co-ordinator

For me, College life was not as I always wanted, if I compare it to my school. There are so many things that I wanted to explore and enjoy but, perhaps, destiny decided something else for me- being a part of a department union. I still remember, when I got selected I thanked God and thought, “At least something good has happened now”.
This was a journey, that pushed me to do something different, allowed me to open the door of self-confidence (still not at that level, but much better than before), and obviously, so many learning experiences! The best thing about being a treasurer for me was clearing the bills, which I really enjoyed. This journey not only gave me a different perspective but also a Kickstarter in improving my personality. And yes, thank you for giving me so many beautiful memories which I am going to cherish for a lifetime.

~ Lavina, Treasurer

From defining my why to finding a different pace. From exploring the hows and whats to the laughters and memories. No matter how bittersweet the journey has been, I am happy and grateful, I could be a part of it. It added just a little shimmer to my college life.

~ Diya, Proctor

When I thought of joining the union in 1st semester I had taken this as a task for myself. But as I started indulging myself, it has become the sweetest learning platform for me. I learned a lot from here and made mistakes too.❤

~ Gargi Bisht, Co-IT Head

I started as the Editorial Head in 2nd year and will be signing off as the General Secretary of Mathema now. This year, I got a chance to lead and host various events as well as learn a lot from my dear coworkers. Overall, it was a great work environment where folks were creative and genuinely relished being together.

~ Prerna Panghal, General Secretary

From tense interview to being a Creative Co-Head, from all the giggles, posters, decors ,end moment preparations to successful events . My journey was a memorable one which cannot be summed up in few words but one thing I am sure of is that I enjoyed working with everyone and learnt so many new things and it helped me develop into a more self - assured person .

~Ishita Soni, Creative Co-Head

Mathema feels like a family and yes I'm aware of how extremely corny this line is but this is how it actually feels. I received a whole lot of love and sincerely hope that I was able to return at least a fraction of it. If I'm being honest I personally was extremely hesitant before applying for creative head(listen I'm not my best version under pressure T_T) but all my doubts were vanished as the union gave me extremely good memories starting right from planning the farewell for our seniors to till now where I can see my beloved juniors planning for our farewell. I won't sugarcoat things to say that it wasn't hard at times but once I saw each event succeeding all the blood, sweat and tears seemed worth it. Apart from providing a great platform for learning and growing the union provided a sense of belonging in this college crowd (and a lot of unbreakable friendships!!!). Joining this union was really the best decision I could have ever made.

~Raima, Creative Head

Being a part of Mathema is the best part of my college life. You get to share your creative ideas with the teachers, interact with the juniors, conduct various events, and of course make the most wonderful memories.

~Nikita, Union Co-ordinator

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Vote of Thanks

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