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Historical Tidbits in Mathematics

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Abstract : We are talking in this paper about biographies and important situations in the life of some of the important mathematicians to obtain benefit and expertise from these important experiences.

1. Introduction

This paper travels with us over mathematical history to review the most important achievements which are accomplished by the mathematical genius. Our stops represent the articulation theories, without them, the current mathematical has never been known.

So it is an invitation to enjoy with mathematicians Niels Abel, Archimedes, Johan Bernoulli, Bernhard Bolzano and Georg Cantor.

2. Niels Abel (1802-1829)

The elliptic function field has been prospered by virtue of Niels Abel, creator of Abelian functions, and one of the pioneers of accuracy users in the mathematics area. His deed made a huge jump in mathematics had been described by one as a revolution that would keep the mathematician busy for five hundred years. Unfortunately, his life was unfair with his glories in science and didn't reflect his realism; it is really an example of the tragedy.

Burning of this interesting scientist was on the fifth of August, 1802 to a Lutheran vicar in Finney, Norway. Moving with his family to Gjerstad was after a short time of his birth. In spite of the needy state of that family, but it had a sacrificial spirit that motivated it to support other seven children. The start of his education was premature at home and then he moves to the Cathedral School in Oslo, where he was admitted, at thirteen years old.

The bad thing which happened to the school was most of its instructors left it and joined the University of Oslo and to be staffed by inexpert, incompetent, and inexperienced instructors. Within all these conditions, Abel did not work in an encouraging performance. The turning point of his monotonic performance was when his professor killed one of his students during beating him for disciplining. That accident made the school management expelled that professor and substituted him with a young Bernt Michael Holmboe who is an assistant of Christopher Hansteen at the university. Both of those men had become close friends and well supporters of Abel. What the days have hidden is that the student has become a professor to his teachers, soon he outpaced to be a professor, his teachers were serving his scientific activities.

2.1 His contributions

Abel gave his first contribution to mathematics before his entering faculty by finding out the general solution to the quintic equation. This achievement was intractable for mathematicians over hundreds of years. $ax^5 + bx^4 + cx^3 + dx^2 + ex + f = 0$. Abel improved that the proposed solution. Hosting and Holmboe believed that there is no one in Norway has the capability to decide whether the answer is right or not. Therefore, they saw to send the paper to Denmark, where the mathematician Ferdinand Degen in. Before arrival at the reply from Denmark, Abel figures out wrong in his sent figures and was suspected of receiving an answer. Eventually, he was sure about the non-existence of an algebraic solution for the quintic equation and that was a result of a new path of work.

The substantial point was a suggestion of the Degen for Abel to search in the field of the Elliptic Integral topic, to be later the icon of Abel fame.
Regrettably, Abel's father died before Abel's joining the University of Oslo in 1821. Instead of his full-time studying, he found himself responsible for supporting his mother and six siblings. The financial problem was greater than his ability to solve it. Hence, he depended on some grants, which are presented to him by the university, gifts from his professors, and special positions to help him clothing and feeding his family. However, he continued his success in mathematics and his stay, one year in the university was enough to graduate. His individual study published an important paper about the definite integrals which involved for the first time a solution of integral equations. In addition, he had valuable works in the field of the integration of the functions. These deeds were enough for the fame and professorship, but unfortunately, he wrote his papers in the Norwegian language therefore, they had been ignored. While, the scientific papers in Europe were written in French or German language.

Abel sought to enter Europe and to show his ability in mathematics. He tried to get a royal grant, but he was suffering from the deficiency of the French and German languages which were dominated over Europe. Therefore, he engaged to learn these two languages. This activity synchronizes with the occasion of his engagement. For his job, he sent a French copy of his paper, involves the solution of the kinetic equation, to the German scientist Gauss who was the greatest mathematician. But the latter did not care with the paper and rejected it as a silly paper and did not even deserve to read.

At last, he had been delegated to study two years in Europe in 1825 by the Norwegian government which was living a difficult financial strait.

The long wait for his trip was completely fruitless because the trip itself was not successful at all. The goal of visiting from Denmark was to meet Degen, but the latter at that time had died. The next visit was in Berlin, which was rather good, he met August Leopold Crelle. Crelle did not exactly understand all Abel's speech. But there was in somehow a communication between them. The German eventually convinced that he was talking to a genius. Abel was in his discussion in the position of the corrector.

The most important thing about that meeting is Abel's gaining of Crelle friendship and to accompany him to University of Gottingen where Gauss was. Crelle could not go with Abel to Paris, where the mathematics hub. When Abel comes to Paris, there was no one of the mathematicians. It was a vacation, and even after ending, none of them was interested but just in their own job. When Abel presented his team about the elliptic functions and integrals to the French Academy of Science, the referees claimed that they could not read his paper because it is written by hand.

One of the two referees whom assigned to evaluate Abel's paper was Cauchy. When he saw this paper, he took it jealously to hide it in his home. He did not show it until one year after Abel death, in 1830. The paper has been acknowledged and it got, from the academy, the grand prize. However, its publication did not occur before 1841.

Abel went back to Norway in defeat. Not only was he not in a position to obtain the appreciation he sought and the professorship he longed for, but he was in debt and had contracted tuberculosis. To add insult to injury, he had been passed over to fill a vacancy in the mathematics department at the university.

The position had been taken by his friend Holmboe. In fact, his friend rejected that position because he was persuaded that the position should be for Abel. However, he accepted it after his certainty that it would be given to another one.

Abel persisted his researches and published many papers on topics of the theory of equations. Moreover, He created a new class of equations so-called Abelian. Simultaneously, a competitor emerged in field of elliptical functions and integral to Abel, that was Carl Jacobi.

The existence of both his competitor side to side with the illness catalyzed him to work hardly. He felt that illness would never allow him much time in life and that he would be absent from it. He put the foundation stone of the new domain and attracted the attention of scientists and especially Leginder who do not see his paper in Paris. He was given the position of professor by many in Europe. That thing was very late because Abel lost his battle against that bloody illness on April 6, 1829.

After two days Crelle notified him that he had eventually been able to secure a post for him at the University of Berlin.

The sad history of Abel's life has in its folds numerous successes which have made great changes in the mathematics of our current life.

Abel proved that there is no solution for the critical equation and presented solutions to defined integrals, Abel theorem, and Abelian functions and equations. The peak of his accomplishments materialized in his discovery of elliptic functions and his use of reliability. Prior to his addition and for many centuries, mathematicians were to take the step with some success.

In similarity to the inversion of the trigonometric functions which are represented by arcing and access...and so on. Abel inverted formulas of integrals into elliptic functions.

On the second subject, Abel quickly realised that much of the preceding mathematical work had not been verified. He took over it as his duty to fill those holes in mathematics and afford the indication that was ignored. His most important effort was earlier suggestion of the general binomial theorem, which was declared by Newton and Euler.

3. Johan Bernoulli (1667-1784)

Johann Bernoulli was one of the innovators in the field of calculation and add to implement the new tool to real problems. His life was among the most controversial of all mathematicians. He was one of the most successful family mathematicians in the world, the Bernoullis.

Johann (also known as Johannes, Jean or John, depending on the translation) Bernoulli was born in Basel, Switzerland, on August 6, 1667. His family originated in Antwerp, Belgium, but had fled to avoid Catholic persecution. After settling in Frankfurt for the first time, Johann's grandfather settled in Basle in 1622. Johann was the tenth son of a prosperous merchant and a local civil servant.

Johann's father had originally tried to turn his child into a merchant, but the son failed miserably as an apprentice. The year 1683 saw his joining the University of Basel, where was his brother, Jacob, working as a well-known professor of mathematics. He sought to study medicine, but his brother taught him mathematics, especially, Leibnizian calculus, which was Johann is mastering it.

His passion for this new field made him adhere to it and to get his Ph.D. In 1694 for his paper on muscular movement. Johann obtained a position not at the University of Basel because his brother was there, but at the University of Groningen.

Johann came back to the University of Basel to occupy his brother's position in 1705, where the latter had passed away that year. His fruitful and valuable work was appreciated and accorded many prizes and honors and one of those is the membership at the academies of Science in Paris, Berlin, St. Petersburg, and others. He died in Basel on 1.1.1748.

Johann faced many problems during his scientific journey. One of them was on a trip to Paris as he met L' Hospital, who was the most famous of French mathematicians. He agreed with the French man to twit him calculus on the other hand, he pays the tuition fee for him. He was happy with this agreement, but it did not continue after publishing the French scientist a book of calculus that included notes and letters of Johann. L'Hospital denied that claim.

. Bernoulli was obviously incensed by the theft and stopped helping his sponging friend.

One of the passive things in Johann's life, that was related to his family problems. In fact, his success in mathematics hurted the relationship between him and his older brother, or let's say the teacher and the pupil. His brother's jealousy prompted his brother to claim all the accomplishments made by Johann. He considered himself Johann's professor and thanked him for everything he had produced.

Sometimes the mails became rather heated than the abuses seemed just as important as the mathematical issue being discussed. Curiously, however, both seemed to develop ideas, starting from the work of the other brother and in many cases, it is likely that the two at least cooperated constantly.

Family issues have not stopped there. In 1700, his son Daniel came into being. Daniel, who would later become known in physics for having founded hydrodynamics, did not have a good relationship with his father. Turns out, Johann was jealous of his son.

In an incident, Daniel was expelled from the house for winning a prize for which the two had competed. In an even more horrifying and dishonest performance, Johann wanted to take credit for his son's discovery. In a more horrible and dishonest performance, Johann wanted to take credit for his son's discovery. These incidents are just two of Johann's many heinous actions against his son.

Bernoulli lived a nervous and uncomfortable life because of the undergoing among the scientists' strifes. One of those problems is the big question of who the founder the calculus Leibniz was or Newton. For Bernoulli, he was biased to Leibniz, where he had a friendship bond with the latter. Eventually, Leibniz got acknowledge by over all over Europe continental.

Within the family domain, there were many common discoveries with his brother in the area of numeracy. For instance, the beginning of calculation variation is attributed to him and his brother. These things created wide arguments between them. Moreover, the dispute was raised between them for a geometric figure known as Brachistochrone, as well as, about many applications in the field of the new calculus.

Johann made hard work on the equation of y=xx, the result of that effort was the Bernoulli series; also he made advances in the ship navigation theory. One of his wonderful skills was his capability in letter writing as he wrote more than 2500 messages and his characteristic tutoring of other famous mathematicians like Leonhard Euler.

Over three generations of the Bernoulli family, there were eight wonderful mathematicians, but the most important among them are Jacob, Johann, and Danial who are stated in the context.

4. Bernhard Bolzano (1781-1848)

Bernard Bolzano has been not just a mathematician, but also a philosopher. The scientific deeds which had done by he did not find the full acceptance until a long time after his death. That effort was focused on the fields of geometry, logic, and real number theory.

He was born in Bohemia, which is known nowadays Czech Republic, on Oct.5.1781. His parents were religious, therefore he was religious. He had brought up according to higher norms of ethics and obligations in religious principles. That was the basis of his bond with the church.

In 1796 Bolzano joined the University of Prague, at that university, he studied mathematics, physics, and philosophy. After ending his studying mathematics, he returned to study philosophy in the department of theology and to be ordained as a Catholic priest in 1804. In spite of his dedication to the church, he did not forget his interest in mathematics to the limit of getting a recommendation to be a chairmanship of the mathematics department.

In 1805, there was a political decision made by the Austro-Hungarian Empire to appoint, at each university, a professorship in the philosophy of religion. That matter influenced him for the rest of his life.

There were different ideological orientations of a national character have free thought that aroused by French revolution and aim to independent of the empire. This activity threatened the unity of the empire, so it invoked fighting the idea with the idea and the priests were good tool for this duty.

The authorities were hoping that the church could by its conservative orientation control the liberal thinking at the time. That is why Bolzano was nominated for that position at the university. Despite Bolzano was a priest, but he was a free thinker. He did not hesitate to express his conviction and tending to the Czech nationalism.

Over the next fourteen years, Bolzano tutored at the university, and his lectures took their influence on both students and his colleagues.

He got well-known for his free thought and then to be dean of the philosophy department in 1818. However, this behavior disturbed the authorities of Austro-Hungarian decided to suspend his profession and freezing every ideological and social activity of him that was in the year 1819 and to stay under see of police. After his rejection to the retreat of his national thought, he lost his seat at the university.

At the next duration, he moved to live in a small village, named Techobuz where he lived until 1842, and then come back to Prague where he continued studying philosophy and mathematics.

Bolzano died on Dec.18.1848. He had many new ideas of logic and mathematics in his life, but for political reasons, they stayed as manuscripts and they had not been published until 1962.

4.1 Bolzano contributions

Bolzano was very interested in the topics of geometry, logic, and real number theory. These three topics took the greatest quota of his contributions in mathematics. He could through working in geometry to recognize sundry problems in Euclidian's reasoning, but he left them without solutions. He was in need of many tools in topology that were not invented yet.

He set up basic definitions of concepts in geometry and declared the Jordan Curve Theorem.

In his work on the real number theory field, aimed to find his foundation and correspond infinite quantities. Despite he could not do that, but he found important results involving the Bolzano-Weierstrass theorem, a modern definition of a continuous function, and the non-differentiating function of Bolzano.

His logical view did not limit to mathematics, but exceeded it to comprehensively addressing for the different aspects of human activities.

5. Georg Cantor (1845-1918)

Georg Cantor is considered the most controversial character among the mathematicians. Perhaps because of his propositions which have strong influences in the known mathematics of his time. He could make a revolution in the concepts of the modern mathematics by creating a new field so-called the modern theory of infinite sets. It can be described as a shock for the mathematicians whom had been divided into defenders and Protestants upon his scientific destinations.

Birthplace of George was St. Petersburg, Russian Federation, on March.3.1845. His father worked as a merchant and was a Jew by religion. After that, his father changes to be a Protestant, whereas his mother was a Catholic Danish woman. The family lived in Russia for eleven years. However, the deterioration of the father's health imposed them to move toward a country more acceptable and that was Germany, precisely Frankfurt, and then to be Georg's home for the rest of his life.

Although, Georg's talent in mathematics which was obvious. His father, the practical man, was trying to convince his son to leave mathematics and specialize in the profession of engineering. Father's will originated from the money-gaining view. Mentally, Georg was inconvenienced by the idea which invokes him to leave mathematics. However, he did not have enough courage to insist on the mathematics field. He lived a long and severe struggle result in his standing up against his father's lust. Eventually, his father understood his son's orientation and allowed to him study mathematics.

Georg entered the university of Zurich, and after his father's death, he went to Berlin, where he studied mathematics, philosophy, and physics. Kronecker and Weierstrass were the most famous of his professors. When he got his Ph.D. In 1867, he could not find a good chance to work, therefore, he was forced to work as an unpaid lecturer. This case did not continue, and he became an assistant professor at the University of Backwater of Halle. In 1874 Georg married and in the same year he published his first paper about set theory.

5.1 Cantor’s studies

When he was submerged in the thought of analyzing a problem, he went deeply into his base especially the infinite sets and sets. An incredible result was found which caused him to tell his friend that he does not believe what he sees. Moreover, he had the ability to prove that whole numbers have equal numbers of members as a set of even numbers, equation roots, square, and cubes. Among his evidences is the number of points by which a line segment consists, equal to the number of points which are comprised of an infinite line. A mathematical space, and a plane.

Some theologians tried to insert his theorems in theology but he distanced himself away from this application, in spite of his interest in this field.

Formerly in mathematics, infinity had been a taboo topic. Previously, Gauss had stated that infinity should only be used as "a way of speaking" and not as a mathematical value. Most mathematicians followed his advice and stayed away. But Cantor couldn't leave her alone.

Cantor deduced that the infinite sets are not only going to infinity but also are completed existence. He named that factual infinite numbers, transfinite numbers. He was promoted to a full professor for his achievements in the field of infinite decors in 1879. His great discoveries brought to him many enemies of mathematicians like Poincare and Kronecker. That is because of the belief conflicting among them.

Cantor sought in his life to acquire a position in the famous University of Berlin. The hostility against him did not dominate him, he had many other friends of well-known mathematicians such that Mittag-Leffler, Dedekind, and Weierstrass who supported his ideas and theorems. The offensive of his opponents left bad nervous and psycho traces on him led him to a specialist hospital. His theorems had not been spotlighted except after his death.

In 1904, the Royal Society of London accorded him a medal, and had been a member of both the London Mathematical Society and the Society of Sciences in Gottingen. He died on Jan.6.1918 in a mental establishment.

Nowadays, Cantor's results have been a clue for many mathematical problems and have been very widespread. At the same time, these results open the door for many problems and enquire, especially within the set theory area which might keep the mathematicians busy for centuries.

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