Karl Weierstrass
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Weierstrass’s life

Karl W. T. Weierstrass was born on October 31, 1815 in Ostenfelde Bavaria. He died on February 19, 1897 of pneumonia at the age of 87. He was the son of Wilhelm Weierstrass and Theodora Vonderforst. At a young age, Karl became interested in mathematics while attending a Gymnasium as a student. There, he reached a high level of mathematical competence as he regularly read Crelle’s Journal and also tutored one of his younger brothers. However, his father had other expectations and wished for him to study finance. So, after graduating from the gymnasium in 1834, Weierstrass attended the University of Bonn where he studied finance, law, and economics. Still, Weierstrass was not interested in this course that his father had planned for him and instead wished to focus on mathematics. This lead to him not attending his courses and instead seeking private classes in mathematics while also studying mathematics on his own. After over three years, during his seventh semester at the University of Bonn, Weierstrass made the decision to dedicate his life to mathematics while neglecting what his father wished for him to study. He finished his eighth and final semester and left immediately without even taking his examinations. On May 22, 1839 Weierstrass enrolled at the Academy in Munster. There, he attended Christoph Gudermann’s lectures on elliptic functions, which were some of the first. Gudermann encouraged Weierstrass's studies and thought very highly of his intelligence. Several years later, Weierstrass began teaching mathematics at the Pro-Gymnasium in Deutsch Krone in West Prussia. Around the year 1850, his health began to deteriorate as he began to suffer from severe dizziness attacks for about 12 years. During this time Weierstrass published several mathematical papers outlining his work which helped bring him fame and recognition. In 1854, his publication of Zur Theorie fer Abelschen Functionen was highly respected in Crelle’s Journal. In the following years he received various offers from universities. He eventually accepted the one he sought after for years, the University of Berlin. However, Weierstrass could not occupy the position immediately due to his health issues. Once there, Weierstrass increased the universities mathematical reputation along with his colleagues Kronecker and Kummer. His final years were quite difficult as he became fully immobile and eventually passed away on February 19, 1897 at the age of 87.

Weierstrass’s mathematical works

Weierstrass first major involvement in mathematics came after his four year tenure at the University of Bonn. During his time at the Academy of Munster, Weierstrass became very interested in the theory of elliptic functions with emphasis on the expansion of functions by power series. Afterwards, during his 14-year teaching career, Weierstrass carried out a program under which analysis was based on rigorous development of the real number system. Later, in 1861, he was credited with the development of a continuous function which had no derivatives. His work on the theory of functions came from a desire to complete work begun by Niels Abel and Carl Jacobi. Abel’s work dealt with independent integrals of algebraic functions and Jacobi’s work dealt with periodic functions with many variables. In 1854, his unexpected memoir on Abelian functions was published in Crelle’s Journal. Weierstrass had few papers in journals as most of his work was presented through his lectures. As a whole, Weierstrass is known as the father of modern analysis. He tested the convergence of series and contributed to many other areas of mathematics such as the theory of periodic functions, functions of real variables, elliptic functions, Abelian functions, converging infinite products, and the calculus of variations. Weierstrass also helped contribute to the advancement of the theory of bilinear and quadratic functions. While his work is known by many, his greatest influence was felt by many of his students.

Collaboration with other scholars

For the most part, Weierstrass was an independent mathematician and did not collaborate with many. His
main collaboration came with his two colleagues, Ernst Kummer and Leopold Kronecker. While in Berlin, these three men gave Berlin the reputation as the leading university for mathematics. Eventually Cantor’s work caused a rift between the two men that almost lead Weierstrass to leave Berlin for Switzerland. Toward the end of his life, Weierstrass taught a very special mathematician named Sofia Kovalevskaya privately. Through his efforts, Kovalevskaya received an honorary doctorate from Gottingen. The two corresponded for nearly 20 years until Kovalevskaya’s death in 1890.

**Historical events that marked Weierstrass’s life.**

Not many majors historical events took place during the 19th century in Germany that effected Weierstrass’s life. Some of the major events in Germany during this time included Germany joining the League of the Three Emperors, the Congress of Berlin, and the Berlin Conference. None of these nearby events had drastic effects of Weierstrass’s life.

**Significant historical events around the world during Weierstrass’s life**

During the 19th century there were many history events occurring all over the world. Slavery was a big problem at the time. In the United States, slavery was rapidly coming up. However in Britain, during 1833, slavery was completely abolished. Also the biggest internal war in United States history, the Civil War, began in 1861 and ended in 1865. In Europe, many internal wars were also occurring between various countries. While many things occurred during this century, Weierstrass was not greatly effected by any historical instances.

**Significant mathematical progress during the Weierstrass’s lifetime**

During this time period there were many famous mathematicians who made major breakthroughs in mathematics. Some of these include Fournier, Euler, Gauss, Galois, Bolyai, Lobachevsky, Riemann, and Cantor. All of these mathematicians worked on different areas of mathematics to make giant leaps in the field. Some major theorems presented during his time include the intermediate value theorem, the prime number theorem, and Dirichlet’s theorem. Other major breakthroughs include advancements in Fermat’s Last Theorem, analytic number theory, the Riemann hypothesis, the prove of the transcendence of e, and the continuum hypothesis. Along with these, there were many other areas of mathematical advancement. Like Weierstrass, many other mathematicians overcame obstacles to leave their mark in the mathematical community.

**Connections between history and the development of mathematics**

Throughout the 19th century a lot of major events took place both in the world and in the mathematical community. While events occurring around the world definitely effected the evolution of mathematics, there were no major events that directly influenced the progression of a specific field of math. As history was evolving everywhere, various mathematicians remained independent and focused on their work.

**Remarks**

**References**


3. http://www-groups.dcs.st-and.ac.uk/-history/Biographies/Weierstrass.html

