INFLUENCE OF SRINIVASA RAMANUJAN and when is the IT Day?

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Introduction

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- **Srinivasa Iyengar Ramanujan** was an Indian mathematician and autodidact.
  He was born on 22 December 1887 in Erode, Madras.
- **He died on 26 April 1920 in Chetput, Madras (Now Chennai).**
- He received his Alma Mater from Government Arts College, Pachaiyappa's College and Trinity College, Cambridge.

- **His academic advisors were**
  Godfrey. H. Hardy and John E. Littlewood.
- **He had no formal training in mathematics**
  but was expert in trigonometry at the age of 12.
  He used to discover theorems of his own.

Godfrey Harold Hardy (1877 – 1947)

- Hardy was an English mathematician, known for his **achievements in number theory and mathematical analysis.**
- **In biology**, he is known for **the Hardy–Weinberg principle, a basic principle of population genetics.**

- Godfrey H. Hardy is usually known by those outside the field of mathematics **for his 1940 essay** ***A Mathematician's Apology***, often considered one of the best insights into the mind of a working mathematician written for the layperson.

Hardy and Ramanujan - Collaborators

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- **Starting in 1914, Hardy was the mentor of the Indian mathematician Srinivasa Ramanujan**, a relationship that has become celebrated. Hardy almost immediately recognised Ramanujan's extraordinary albeit untutored brilliance, and Hardy and Ramanujan became close collaborators.
- In an interview by **Paul Erdős**, when Hardy was asked what his greatest contribution to mathematics was, **Hardy unhesitatingly replied that it was the discovery of Ramanujan.**
- In a lecture on Ramanujan, Hardy said that **"my association with him is the one romantic incident in my life".**

John Edensor Littlewood (1885-1977)

- From 1911, Hardy collaborated with **John Edensor Littlewood**, in extensive work **in mathematical analysis and analytic number theory**. This (along with much else) led to quantitative progress on **Waring's problem,** as part of **the Hardy–Littlewood circle method,** as it became known. In prime number theory, they proved results and some notable conditional results.

- This was a major factor in the development of number theory as a system of conjectures; examples are the first and second Hardy–Littlewood conjectures. **Hardy's collaboration with Littlewood is among the most successful and famous collaborations in mathematical history.**

- In a 1947 lecture, the Danish mathematician **Harald Bohr** reported a colleague as saying, **"Nowadays, there are only three really great English mathematicians: Hardy, Littlewood, and Hardy–Littlewood."**

Hardy and Littlewood

EARLY life¨of Srinivasa

- He lived in Sarangapani Street in Kumbakonam .
- He had gone school first on 1. 10. 1892.
- He had to switch primary school 3 times due to circumstances .
- Once, he had completed his exam in half the allotted time .
- In 1903, Ramanujan obtained from a friend a library copy of a *A Synopsis of Elementary Results in Pure and Applied Mathematics,* G. S. Carr's collection of 5,000 theorems .
- He reportedly studied the contents of the book in detail. The book is generally acknowledged as a key element in awakening his genius .
- He had left college without a degree and pursued research in mathematics .

Contacting British mathematicians

- **Godfrey Harold Hardy** was an academician at Cambridge University. On 16 January 1913, Ramanujan wrote to G. H. Hardy.
  He recognised some of Ramanujan's formulae but others were impossible to believe.
- Hardy believed that Ramanujan's theorems must be true otherwise no one could have imagined to invent them.
- **Hardy invited Ramanujan to Cambridge University but Ramanujan refused.** He then enlisted **E. H. Neville (Hardy's colleague)** to bring Ramanujan to England. With his parents supporting him he agreed to the proposal this time.

Life In England

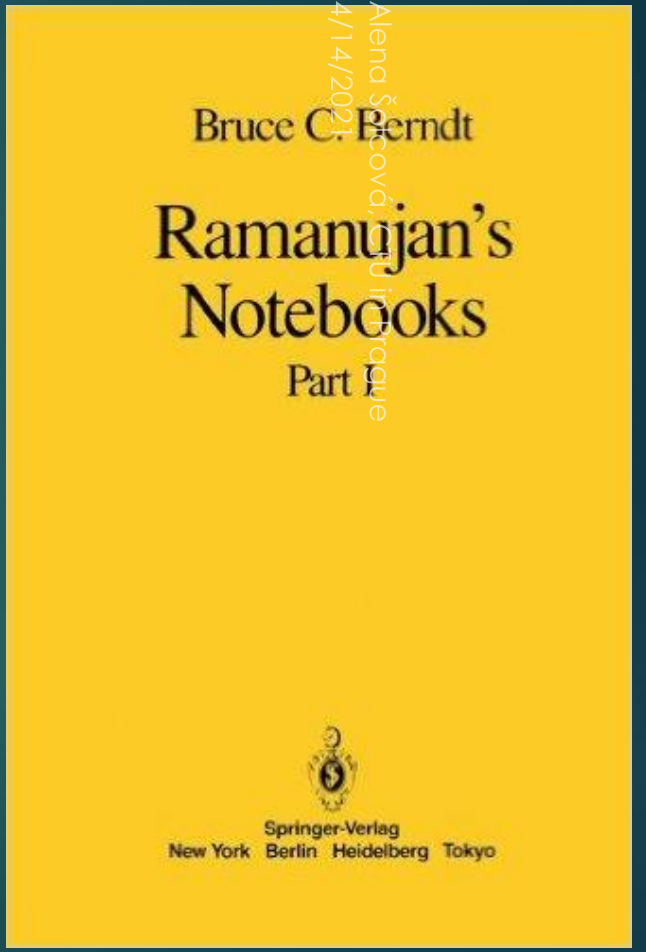
- Ramanujan departed from Madras aboard the S.S. *Nevasa* **on 17 March 1914 and arrived in London on 14 April. He began working with Hardy and Littlewood.**
- **Hardy had received 120 theorems from Ramanujan in the first two letters, but there were many more results and theorems in the notebooks.**
- **Ramanujan spent nearly 5 years in Cambridge.**
- **He was awarded a Bachelor of Science degree by research (this degree was later renamed PhD) in March 1916 for his work on highly composite numbers.**
- **On 6 December 1917, he was elected to the London Mathematical Society.**
- **In 1918 he was elected a Fellow of the Royal Society.**
- **He became the first Indian to be elected a Fellow of Trinity College, Cambridge.**

Illness and return to India

- Ramanujan's health worsened in England.
- Diagnosed with tuberculosis and
  a severe vitamin deficiency.
- In 1919 he returned to Kumbakonam, Madras Presidency,
  and soon thereafter, in 1920, died at the age of 32.
- In 1994, Dr. D. A. B. Young analysed his records and concluded that he had hepatic amoebiasis.

Ramanujan's notebooks

- Ramanujan recorded his results in four notebooks of loose-leaf paper. They were mostly written up without any derivations .
- Mathematician Bruce C. Berndt says that Ramanujan most certainly was able to prove most of his results, but chose not to.
- Since paper was very expensive, Ramanujan would do most of his work and perhaps his proofs on slate.
- He was also quite likely to have been influenced by the style of G. S. Carr's book, which stated results without proofs.
- Mathematicians such as Hardy, G. N. Watson, B. M. Wilson, and Bruce Berndt created papers exploring material from Ramanujan's work.



Hardy–Ramanujan number 1729

- The number 1729 is known as the Hardy–Ramanujan number after a famous visit by Hardy to see Ramanujan at a hospital.
- Hardy arrived in a cab numbered 1729.
- Hardy commented that the number was very uninteresting.
- Instantly Ramanujan claimed that it was the smallest natural number which can be as the sum of two cubes in two different ways.
- The two different ways are:

$$1729 = 1^3 + 12^3 = 9^3 + 10^3.$$

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Recognition of Ramanujan

- **Tamil Nadu celebrates 22 December (Ramanujan's birthday) as 'State IT Day'.**
- A stamp picturing Ramanujan was released by the Government of India in 1962 – the 75th anniversary of Ramanujan's birth.
- **22 December, has been annually celebrated as Ramanujan Day by the Government Arts College, Kumbakonam.**
- The SASTRA University, based in the state of Tamil Nadu in South India,

  has instituted the SASTRA Ramanujan Prize of US$10,000 to be given annually to a mathematician not exceeding the age of 32 for outstanding contributions in an area of mathematics influenced by Ramanujan.