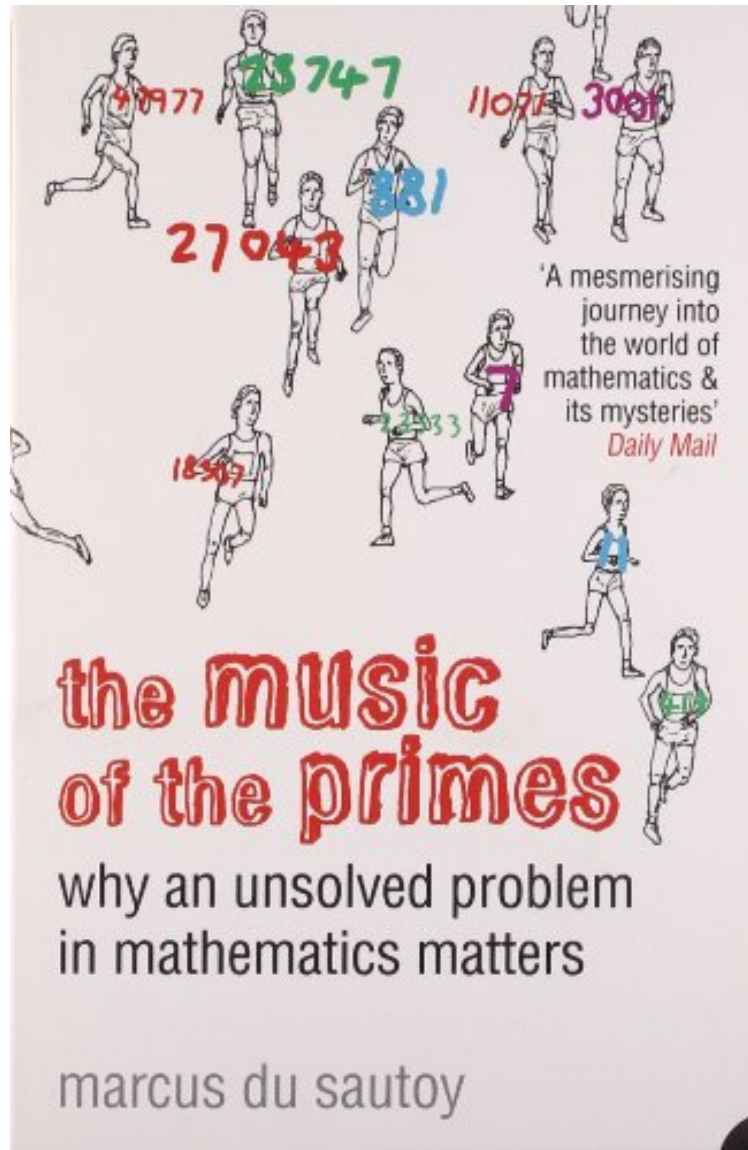


The Music of the Primes: Why an Unsolved Problem in Mathematics Matters

Marcus du Sautoy

DOC | *audiobook | ebooks | Download PDF | ePub



DOWNLOAD



READ ONLINE

#5060293 in Books imusti 2004-09-06Original language:EnglishPDF # 1 7.80 x .94 x 5.081, .57 #File Name: 1841155802368 pagesHARPER PERENNIAL | File size: 19.Mb

Marcus du Sautoy : The Music of the Primes: Why an Unsolved Problem in Mathematics Matters before purchasing it in order to gage whether or not it would be worth my time, and all praised The Music of the Primes: Why an Unsolved Problem in Mathematics Matters:

0 of 0 people found the following review helpful. An important and complete book about the zeta of Riemann.By

Edoardo Angeloni Great book for its exact way of describing the progress in mathematics. The zeta of Riemann born as statistical interpretation of number of primes in an interval. In 1800 many mathematical researchers follow this position, finding to show that, particularly Gauss and Hilbert. But a true proof looks like very difficult to find. In 1900 this proof is tried at computer as for the theorem of 4-colours, but without important results. Finally in last years Connes has used those questions for the problem of the renormalization of the quantum space. That produces the translation of the concepts from geometry to algebra. 0 of 0 people found the following review helpful. A prime book on primes By John Gale A brilliant summary regarding prime numbers, with the best explanation in general terms of the Riemann Hypothesis and its implications that I have yet come across. The many biographical inclusions of pioneering mathematicians makes for added interest, and extends to computing and cryptography, finally embracing quantum chaos. First published in 2003, this is still a very modern book by Marcus du Sautoy, and at a price of just \$10.17 US, why wouldn't you include it in your library? A great read. 0 of 0 people found the following review helpful. An excellent history of the mathematic fraternity over the past three ... By Piet van Niekerk An excellent history of the mathematic fraternity over the past three or four centuries. The Riemann hypothesis being the one major challenge for the other mathematicians to prove right or wrong. The author follows a step by step timeline with the prodigious attempts in each period explained in detail. Easy to read and follow if you are mathematically inclined and difficult to put it down.

The paperback of the critically-acclaimed popular science book by a writer who is fast becoming a celebrity mathematician. Prime numbers are the very atoms of arithmetic. They also embody one of the most tantalising enigmas in the pursuit of human knowledge. How can one predict when the next prime number will occur? Is there a formula which could generate primes? These apparently simple questions have confounded mathematicians ever since the Ancient Greeks. In 1859, the brilliant German mathematician Bernhard Riemann put forward an idea which finally seemed to reveal a magical harmony at work in the numerical landscape. The promise that these eternal, unchanging numbers would finally reveal their secret thrilled mathematicians around the world. Yet Riemann, a hypochondriac and a troubled perfectionist, never publicly provided a proof for his hypothesis and his housekeeper burnt all his personal papers on his death. Whoever cracks Riemann's hypothesis will go down in history, for it has implications far beyond mathematics. In business, it is the lynchpin for security and e-commerce. In science, it has critical ramifications in Quantum Mechanics, Chaos Theory, and the future of computing. Pioneers in each of these fields are racing to crack the code and a prize of \$1 million has been offered to the winner. As yet, it remains unsolved. In this breathtaking book, mathematician Marcus du Sautoy tells the story of the eccentric and brilliant men who have struggled to solve one of the biggest mysteries in science. It is a story of strange journeys, last-minute escapes from death and the unquenchable thirst for knowledge. Above all, it is a moving and awe-inspiring evocation of the mathematician's world and the beauties and mysteries it contains.

From Publishers Weekly The quest to bring advanced math to the masses continues with this engaging but quixotic treatise. The mystery in question is the Riemann Hypothesis, named for the hypochondriac German mathematician Bernhard Reimann (1826-66), which ties together imaginary numbers, sine waves and prime numbers in a way that the world's greatest mathematicians have spent 144 years trying to prove. Oxford mathematician and BBC commentator du Sautoy does his best to explain the problem, but stumbles over the fact that the Riemann Hypothesis and its corollaries are just too hard for non-tenured readers to understand. He falls back on the staples of math popularizations by shifting the discussion to easier math concepts, offering thumbnail sketches of other mathematicians and their discoveries, and occasionally overdramatizing the sedentary lives of academics (one is said to be a "benign Robespierre" whose non-commutative geometry "has instilled terror" in his colleagues). But du Sautoy makes the most of these genre conventions. He is a fluent expositor of more tractable mathematics, and his portraits of math notables--like the slipper-shod, self-taught Indian Srinivasa Ramanujan, a mathematical Mozart who languished in chilly Cambridge--are quite vivid. His discussion of the Riemann Hypothesis itself, though, can lapse into metaphors ("By combining all these waves, Riemann had an orchestra that played the music of the primes") that are long on sublime atmospherics but short on meaningful explanation. The consequences of the hypothesis--a possible linkage to "quantum chaos," implications for internet data encryption--may seem less than earth-shaking to the lay reader, but for mathematicians, the Riemann Hypothesis may be the "deepest and most fundamental problem" going. 40 illustrations, charts and photos. Copyright 2003 Reed Business Information, Inc. From Scientific American The unpredictable drip from a leaky faucet can drive almost anyone mad. Prime numbers, those divisible only by one and themselves, present a numerical equivalent. For centuries, mathematicians have tried to find a simple formula to describe where these numbers fall along the number line. But their spacing--1, 2, 3, drip, 5, drip, 7, drip, drip, drip, 11, drip, and so forth--seems to defy prediction. In 1859 German mathematician Bernhard Riemann uncovered an apparent key to unlocking the pattern, but he couldn't verify it. Many great minds have become obsessed with proving his guess, referred to as the Riemann Hypothesis (RH), ever since. Three books published in April chronicle this quest. The books cover much of the same ground, but each has a different strength. The text with the simplest title, *The Riemann Hypothesis*, by

science writer Karl Sabbagh, provides ample hand-holding for anyone who pales at the sight of symbols or can't quite distinguish an asymptote from a hole in the graph. In *Prime Obsession*, by John Derbyshire, a mathematically trained banker and novelist, Riemann and his colleagues come to life as real characters and not just adjectives for conjectures and theorems. And in *The Music of the Primes*, written by University of Oxford mathematics professor Marcus du Sautoy, the meaning of Riemann's work unfolds by way of rich musical analogies. Why three books on the same difficult subject now? One obvious answer is that the notoriety of the RH only recently spread to circles beyond math-faculty common rooms. In 2000 the Clay Mathematics Institute (CMI), a private research organization funded by Boston banker cum math fan Landon T. Clay, offered a \$1-million prize for the solution. The move won Riemann almost as many posthumous headlines as Fermat. CMI offers the one-buck bounty on seven outstanding mathematical mysteries. These so-called millennium problems are a 21st-century follow-up to German mathematician David Hilbert's famous stumpers, presented in 1900 to the Second International Congress of Mathematicians in Paris. The Riemann Hypothesis is the only problem to make both lists, a century apart--and with good reason: it is exceedingly complex, and a mounting number of results require that it be true. Timing, too, has played a part. At the end of the 18th century Carl Friedrich Gauss, one of Riemann's mentors, produced what was then the best approximation for the number of primes less than some number N --namely, $N/\log N$. This value is sometimes too big and sometimes too small, but Gauss predicted that the error would shrink for larger N s. By the end of the 19th century Jacques Hadamard and Charles de la Vallée Poussin proved this suggestion, called the prime number theorem (PNT). The RH was the next obvious mark. Riemann's original wording does not mention prime numbers at all but instead addresses the so-called zeta function, $\zeta(s) = 1 + 1/2^s + 1/3^s + 1/4^s + \dots + 1/n^s$. For $s = 1$, this function is the familiar harmonic series. For inputs greater than one, however, zeta becomes more exotic. Swiss mathematician Leonhard Euler discovered in the 1700s that for $s = 2$, zeta converges on the square of pi divided by six. It was a startling find. The decimal expansion of pi is unpredictable, and yet by way of the zeta function, it could be summed from an infinite series of neat fractions. Euler's break was the first such "zeta bridge" between seeming randomness and order. Riemann forged the next by feeding the zeta function complex numbers, those of the form $a + bi$, having both real and imaginary parts. These numbers were a new invention at the time. Riemann had learned about them in Paris and brought them back to Göttingen, where he studied under Lejeune Dirichlet, Gauss's successor. The older man was well acquainted with the zeta function, which he had invoked to prove one of Fermat's prime-number assertions. For Riemann, then, it was a small leap to try the new numbers in the old function. To sum up what these books take 300-plus pages to explain, Riemann homed in on points for which the zeta function fed with imaginary numbers equaled zero and viewed these "zeros" as waves--much as Euler had produced sine waves corresponding to musical notes from plugging imaginary numbers into the exponential function 100 years before. Riemann further made a connection between these waves and his own refinement of Gauss's PNT, dubbed $R(N)$: by adding $R(N)$ to the height of each wave above N , he could generate the exact number of primes less than N . The location of the zeros, therefore, led to that of the primes, and Riemann asserted that the zeros followed a simple pattern. They all had a real part of $1/2$. In other words, were you to graph zeta, the zeros would fall along a single line. Each of the books satisfactorily presents Riemann's math--as much as it is possible to do so for a general audience--but they offer very different reading experiences. *The Music of the Primes* made me feel as if I were sitting through a gracefully worded lecture. *The Riemann Hypothesis* is more journalistic, relying on quotes from working mathematicians to tell the story. Parts of *Prime Obsession* read almost like a novel, others like a mathematical text. Its author, Derbyshire, segmented the book so that most of the math falls into odd chapters and the history and biographical material in even ones, but the math is as interesting as the rest. When will the RH be solved? None of the books dares to predict. Hilbert, one of the greatest mathematicians of all time, forecasted that it would happen within his lifetime. He died in 1943. In other words, it's still anyone's guess. Kristin Leutwyler turned from the study of mathematics to journalism, serving until recently as editor of *Scientific American's* Web site. Now a freelance writer, she is the author of the forthcoming book *The Moons of Jupiter* (W. W. Norton, 2003). From Booklist*Starred * Thanks to Du Sautoy's exceptional gift for translating professional insights into plain language, general readers can now contemplate prime numbers (numbers--such as 3, 5, 7, and 11--not divisible by any smaller whole number) with something of the wonder and awe that these numbers have stirred among mathematicians since the days of Euclid. In a capacious and wide-ranging narrative, Du Sautoy traces the swelling of interest in primes during the last 250 years as mathematicians have searched for some hidden pattern behind their apparently random sequence. After the greatest pioneer in this search, German mathematician Bernhard Riemann, intuited a hypothetical looking-glass harmony in the primes, ambitious minds around the world embarked on a quest to prove his daring conjecture. Yet today a million-dollar prize for such a proof remains unclaimed, as the best and brightest admit defeat. The absence of a buttressing proof, however, has not prevented the Riemann Hypothesis from growing ever more important to theoretical scientists (in quantum physics and chaotic systems) and practical technicians (in cryptography and electronic security). Fortunately, whether dealing with nuclear energy levels or credit-card encryption, Du Sautoy alloys his lucid explanations of mathematical principles with piquant anecdotes about the cross-grained personalities who have developed them--from a womanizing Oxford cyclist to a paranoid Buddhist recluse. A book that will draw readers normally indifferent to the subject deep into the adventure of mathematics. Bryce Christensen Copyright

