

## Alan M Turing

A provocative theme in this book is that many computer scientists do not consistently distinguish between their favorite mathematical concepts and the representations thereof in the real world. This leads to mistakes. Bonus: unsound mathematics, the history of programming, and Dutch computer builder Willem van der Poel.

In this 2013 winner of the prestigious R.R. Hawkins Award from the Association of American Publishers, as well as the 2013 PROSE Awards for Mathematics and Best in Physical Sciences & Mathematics, also from the AAP, readers will find many of the most significant contributions from the four-volume set of the Collected Works of A. M. Turing. These contributions, together with commentaries from current experts in a wide spectrum of fields and backgrounds, provide insight on the significance and contemporary impact of Alan Turing's work. Offering a more modern perspective than anything currently available, Alan Turing: His Work and Impact gives wide coverage of the many ways in which Turing's scientific endeavors have impacted current research and understanding of the world. His pivotal writings on subjects including computing, artificial intelligence, cryptography, morphogenesis, and more display continued relevance and insight into today's scientific and technological landscape. This collection provides a great service to researchers, but is also an approachable entry point for readers with limited training in the science, but an urge to learn more about the details of Turing's work. 2013 winner of the prestigious R.R. Hawkins Award from the Association of American Publishers, as well as the 2013 PROSE Awards for Mathematics and Best in Physical Sciences & Mathematics, also from the AAP Named a 2013 Notable Computer Book in Computing Milieux by Computing Reviews Affordable, key collection of the most significant papers by A.M. Turing Commentary explaining the significance of each seminal paper by preeminent leaders in the field Additional resources available online

Alan Turing ranks as one of the most brilliant of twentieth-century mathematicians. He is perhaps best known as one of the founding fathers of two fields of mathematics with enormous implications in the modern world: computer science and artificial intelligence. In addition, Turing's work in decoding the German spy machine known as the Enigma was arguably one of the most important accomplishments in bringing World War II to a successful conclusion for the United States, Great Britain, and their Allies.

Containing never-before-published material, this fascinating account sheds new light on one of the greatest figures of the twentieth century.

Cryptography is a vital technology that underpins the security of information in computer networks. This book presents a comprehensive introduction to the role that cryptography plays in providing information security for everyday technologies such as the Internet, mobile phones, Wi-Fi networks, payment cards, Tor, and Bitcoin. This book is intended to be introductory, self-contained, and widely accessible. It is suitable as a first read on cryptography. Almost no prior knowledge of mathematics is required since the book deliberately avoids the details of the mathematics techniques underpinning cryptographic mechanisms. Instead our focus will be on what a normal user or practitioner of information security needs to know about cryptography in order to understand the design and use of everyday cryptographic applications. By focusing on the fundamental principles of modern cryptography rather than the technical details of current cryptographic technology, the main part this book is relatively timeless, and illustrates the application of these principles by considering a number of contemporary applications of cryptography. Following the revelations of former NSA contractor Edward Snowden, the book considers the wider societal impact of use of cryptography and strategies for addressing this. A reader of this book will not only be able to understand the everyday use of cryptography, but also be able to interpret future developments in this fascinating and crucially important area of technology.

An exhaustive work that represents a landmark exploration of both the philosophical and methodological issues surrounding the search for true artificial intelligence. Distinguished psychologists, computer scientists, philosophers, and programmers from around the world debate weighty issues such as whether a self-conscious computer would create an internet 'world mind'. This hugely important volume explores nothing less than the future of the human race itself.

In this book from the critically acclaimed Little People, BIG DREAMS series, discover the life of Alan Turing, the genius code cracker and father of theoretical computer science and artificial intelligence. Alan grew up in England, where his best friends were numbers and a little boy called Christopher. When his young friend died, Alan retreated to the world of numbers and codes, where he discovered how to crack the code of the Nazi Enigma machine. This moving book features stylish and quirky illustrations and extra facts at the back, including a biographical timeline with historical photos and a detailed profile of the brilliant mathematician's life. Little People, BIG DREAMS is a best-selling series of books and educational games that explore the lives of outstanding people, from designers and artists to scientists and activists. All of them achieved incredible things, yet each began life as a child with a dream. This empowering series offers inspiring messages to children of all ages, in a range of formats. The board books are told in simple sentences, perfect for reading aloud to babies and toddlers. The hardcover versions present expanded stories for beginning readers. Boxed gift sets allow you to collect a selection of the books by theme. Paper dolls, learning cards, matching games, and other fun learning tools provide even more ways to make the lives of these role models accessible to children. Inspire the next generation of outstanding people who will change the world with Little People, BIG DREAMS!

Provides an expansion of Turing's original paper, a brief look at his life, and information on the Turing machine and computability topics.

Alan Turing was an extraordinary man who crammed into a life of only 42 years the careers of mathematician, codebreaker, computer scientist and biologist. His codebreaking work at Bletchley Park was so significant it helped to shorten the Second World War, and with Tommy Flowers he built the first computer. A man ahead of his time, many of his theories and calculations are still relevant today. Often believed to be an eccentric loner, recent research by his nephew, Dermot Turing, has unearthed a fresh perspective, and here his story is condensed into a short, accessible Pitkin guide. Award winning authors Jim Ottaviani and Leland Purvis present a historically accurate graphic novel biography of English mathematician and scientist Alan Turing in *The Imitation Game*. English mathematician and scientist Alan Turing (1912-1954) is credited with many of the foundational principles of contemporary computer science. *The Imitation Game* presents a historically accurate graphic novel biography of Turing's life, including his groundbreaking work on the fundamentals of cryptography and artificial intelligence. His code breaking efforts led to the cracking of the German Enigma during World War II, work that saved countless lives and accelerated the Allied defeat of the Nazis. While Turing's achievements remain relevant decades after his death, the story of his life in post-war Europe continues to fascinate audiences today. Award-winning duo Jim Ottaviani (the #1 New York Times bestselling author of *Feynman* and *Primates*) and artist Leland Purvis (an Eisner and Ignatz Award nominee and occasional reviewer for the *Comics Journal*) present a factually detailed account of Turing's life and groundbreaking research--as an unconventional genius who was arrested, tried, convicted, and punished for his openly gay lifestyle, and whose innovative work still fuels the computing and communication systems that define our

modern world. Computer science buffs, comics fans, and history aficionados will be captivated by this riveting and tragic story of one of the 20th century's most unsung heroes.

'In a short life he accomplished much, and to the roll of great names in the history of his particular studies added his own.' So is described one of the greatest figures of the twentieth century, yet Alan Turing's name was not widely recognised until his contribution to the breaking of the German Enigma code became public in the 1970s. The story of Turing's life fascinates and in the years since his suicide, Turing's reputation has only grown, as his contributions to logic, mathematics, computing, artificial intelligence and computational biology have become better appreciated. To commemorate the centenary of Turing's birth, this republication of his mother's biography is enriched by a new foreword by Martin Davis and a never-before-published memoir by Alan's older brother. The contrast between this memoir and the original biography reveals tensions and sheds new light on Turing's relationship with his family, and on the man himself.

Alan Turing has long proved a subject of fascination, but following the centenary of his birth in 2012, the code-breaker, computer pioneer, mathematician (and much more) has become even more celebrated with much media coverage, and several meetings, conferences and books raising public awareness of Turing's life and work. This volume will bring together contributions from some of the leading experts on Alan Turing to create a comprehensive guide to Turing that will serve as a useful resource for researchers in the area as well as the increasingly interested general reader. The book will cover aspects of Turing's life and the wide range of his intellectual activities, including mathematics, code-breaking, computer science, logic, artificial intelligence and mathematical biology, as well as his subsequent influence.

The collected works of Turing, including a substantial amount of unpublished material, will comprise four volumes: Mechanical Intelligence, Pure Mathematics, Morphogenesis and Mathematical Logic. Alan Mathison Turing (1912-1954) was a brilliant man who made major contributions in several areas of science. Today his name is mentioned frequently in philosophical discussions about the nature of Artificial Intelligence.

Actually, he was a pioneer researcher in computer architecture and software engineering; his work in pure mathematics and mathematical logic extended considerably further and his last work, on morphogenesis in plants, is also acknowledged as being of the greatest originality and of permanent importance. He was one of the leading figures in Twentieth-century science, a fact which would have been known to the general public sooner but for the British Official Secrets Act, which prevented discussion of his wartime work. What is maybe surprising about these papers is that although they were written decades ago, they address major issues which concern researchers today.

It is only a slight exaggeration to say that the British mathematician Alan Turing (1912-1954) saved the Allies from the Nazis, invented the computer and artificial intelligence, and anticipated gay liberation by decades--all before his suicide at age forty-one. This classic biography of the founder of computer science, reissued on the centenary of his birth with a substantial new preface by the author, is the definitive account of an extraordinary mind and life. A gripping story of mathematics, computers, cryptography, and homosexual persecution, Andrew Hodges's acclaimed book

captures both the inner and outer drama of Turing's life. Hodges tells how Turing's revolutionary idea of 1936--the concept of a universal machine--laid the foundation for the modern computer and how Turing brought the idea to practical realization in 1945 with his electronic design. The book also tells how this work was directly related to Turing's leading role in breaking the German Enigma ciphers during World War II, a scientific triumph that was critical to Allied victory in the Atlantic. At the same time, this is the tragic story of a man who, despite his wartime service, was eventually arrested, stripped of his security clearance, and forced to undergo a humiliating treatment program--all for trying to live honestly in a society that defined homosexuality as a crime.

Alan Turing, subject of the Oscar-winning 2014 film *The Imitation Game*, was the brilliant mathematician solicited by the British government to help decipher messages sent by Germany's Enigma machines during World War II. The work of Turing and his colleagues at Hut 8 created what became known as the "bombe" which descrambled the German navy's messages and saved countless lives and millions in British goods and merchandise. Despite his heroics, however, Turing led a secret life as a homosexual; haunted by the accidental death of a young love, he got briefly engaged to Joan Clarke, a fellow cryptanalyst, until he told her the truth. After a young man with whom he was involved stole money from him, he went to the police, where he confessed his homosexuality; he was charged with gross indecency, and only avoided prison after agreeing to undergo chemical castration. Tragically, he committed suicide two years later, by ingesting cyanide through a poisoned apple. The particulars of Turing's achievements were only made known in 2012, following the release of once-classified papers. Authors Liberge and Delalande used this information to create a biography that is scientifically rigorous yet understandable for the lay reader. It's also a meticulous depiction of World War II, and an intimate portrayal of a gay man living in an intolerant world. Delving deeper into Turing's life than *The Imitation Game*, this graphic novel is a fascinating portrait of this brilliant, complicated, and troubled man.

*Alan Turing: Enigma: The Incredible True Story of the Man Who Cracked The Code* If you have ever used a computer, you owe that joy to Alan Turing. Turing is known by many as the Father of the Modern Computer for his conception of the theoretical stored-memory machine (known as the Turing Machine) and for the subsequent implementation of this idea in the creation of some of the world's first working computers, the Automatic Computing Engine, and the Manchester Mark 1. Impressive as they are, though, Turing's contributions to computer science are not necessarily his most famous or influential projects. Alan Turing was one of the most significant figures in the Allied victory of World War Two, thanks to his ingenious code breaking skills and the invention of the British Bombe at Bletchley Park. In his later life, Turing even dabbled in artificial intelligence, and biology, creating concepts that are still being investigated today. Until recently, Alan Turing had often been overlooked as an important figure in history. Thanks to in-depth biographies like Andrew Hodges' *Alan Turing: The Enigma*, and film depictions of Turing's life, like *The Imitation Game*, based on Hodges' book, Alan Turing is quickly becoming a household name, as people begin to recognize that his contributions to various fields were so influential they actually changed the course of human history.

Volume 10 in the Babbage Reprint Series contains two archival papers by Alan Turing--the

ACE report (1945), a seminal paper detailing the design for an electronic universal machine called the Automatic Computing Engine (ACE), and Turing's Lecture to the London Mathematical Society (1947) amplifying the ideas outlined in the ACE report. Turing's report was the first time that the notion of artificial intelligence was discussed as a real possibility and Turing went on to devote the next decade to AI. Michael Woodger's paper, *The History and Present Use of Digital Computers at the National Physical Laboratory* (1958) gives a brief history of the construction of the pilot ACE, the first functional version of Turing's universal machine.

"This book is organized around three concepts fundamental to OS construction: virtualization (of CPU and memory), concurrency (locks and condition variables), and persistence (disks, RAIDS, and file systems"--Back cover.

Alan Turing was an extraordinary man who crammed into a life of only 42 years the careers of mathematician, codebreaker, computer scientist and biologist. He is widely regarded as a war hero grossly mistreated by his unappreciative country and it has become hard to disentangle the real man from the story. It is easy to cast him as a misfit, the stereotypical professor. But actually Alan Turing was never a professor, and his nickname 'Prof' was given by his codebreaking friends at Bletchley Park. Now, Alan Turing's nephew, Dermot Turing, has taken a fresh look at the influences on Alan Turing's life and creativity, and the later creation of a legend. For the first time it is possible to disclose the real character behind the cipher-text: how did Alan's childhood experiences influence the man? Who were the influential figures in Alan's formative years? How did his creative ideas evolve? Was he really a solitary, asocial genius? What was his wartime work after 1942, and why was it kept even more secret than the Enigma story? What is the truth about Alan Turing's conviction for gross indecency, and did he commit suicide? What is the significance of the Royal Pardon granted in 2013? In Dermot's own style he takes a vibrant and entertaining approach to the life and work of a true genius. Meet Alan Turing. Famous mathematician, cryptographer, and...superhero! This next book in the My Super Science Heroes series shares the amazing story of Alan Turing and how he used his astonishing superpower of curiosity to overcome obstacles and solve problems. This series is scientifically vetted and promoted by the Marie Curie Alumni Association, which promotes the worldwide advancement of knowledge. One sunny day in June 1912, a new super science hero was born. He hadn't figured out he was a super science hero; though everyone else around him was pretty sure about this early on. His name was Alan Turing. Super Evil Nemesis decides to call on his minion Ms. Deception to confound and confuse Alan—but because Alan likes working on puzzles, he's not easy to defeat... The minion in this book will speak in code (which will read like nonsense). As the story progresses, Alan will crack the code on Ms. D's enigma machine and be able to decipher her speech, which is how he befriends her. At the end of the book, we will provide a decryption key that allows the children to decipher what the minion is saying in earlier pages. This is the AMAZING (mostly) true story of how Alan Turing had a superpower that helped him become a successful scientist. But, of course, the super power is really something we all have inside of us.

Mathematical Logic is a collection of the works of one of the leading figures in 20th-century science. This collection of A.M. Turing's works is intended to include all his mature scientific writing, including a substantial quantity of unpublished material. His work in pure mathematics and mathematical logic extended considerably further; the work of his last years, on morphogenesis in plants, is also of the greatest originality and of permanent importance. This book is divided into three parts. The first part focuses on computability and ordinal logics and covers Turing's work between 1937 and 1938. The second part covers type theory; it provides a general introduction to Turing's work on type theory and covers his published and unpublished works between 1941 and 1948. Finally, the third part focuses on enigmas, mysteries, and loose ends. This concluding section of the book discusses Turing's Treatise on

the Enigma, with excerpts from the Enigma Paper. It also delves into Turing's papers on programming and on minimum cost sequential analysis, featuring an excerpt from the unpublished manuscript. This book will be of interest to mathematicians, logicians, and computer scientists.

Alan M. Turing Centenary Edition Cambridge University Press

A NEW YORK TIMES BESTSELLER The official book behind the Academy Award-winning film *The Imitation Game*, starring Benedict Cumberbatch and Keira Knightley It is only a slight exaggeration to say that the British mathematician Alan Turing (1912-1954) saved the Allies from the Nazis, invented the computer and artificial intelligence, and anticipated gay liberation by decades--all before his suicide at age forty-one. This New York Times--bestselling biography of the founder of computer science, with a new preface by the author that addresses Turing's royal pardon in 2013, is the definitive account of an extraordinary mind and life.

Capturing both the inner and outer drama of Turing's life, Andrew Hodges tells how Turing's revolutionary idea of 1936--the concept of a universal machine--laid the foundation for the modern computer and how Turing brought the idea to practical realization in 1945 with his electronic design. The book also tells how this work was directly related to Turing's leading role in breaking the German Enigma ciphers during World War II, a scientific triumph that was critical to Allied victory in the Atlantic. At the same time, this is the tragic account of a man who, despite his wartime service, was eventually arrested, stripped of his security clearance, and forced to undergo a humiliating treatment program--all for trying to live honestly in a society that defined homosexuality as a crime. The inspiration for a major motion picture starring Benedict Cumberbatch and Keira Knightley, *Alan Turing: The Enigma* is a gripping story of mathematics, computers, cryptography, and homosexual persecution.

Outlines the Bletchley Park mathematician's efforts to launch artificial intelligence innovations, describing his thwarted attempts to gain support for a programmable calculating machine, his contributions to cracking the Nazi Enigma code during World War II, and how the revelation of his homosexuality led to his tragic imprisonment and suicide. Reprint.

The mathematical genius Alan Turing, now well known for his crucial wartime role in breaking the ENIGMA code, was the first to conceive of the fundamental principle of the modern computer--the idea of controlling a computing machine's operations by means of a program of coded instructions, stored in the machine's 'memory'. In 1945 Turing drew up his revolutionary design for an electronic computing machine--his Automatic Computing Engine ('ACE'). A pilot model of the ACE ran its first program in 1950 and the production version, the 'DEUCE', went on to become a cornerstone of the fledgling British computer industry. The first 'personal' computer was based on Turing's ACE. *Alan Turing's Automatic Computing Engine* describes Turing's struggle to build the modern computer. The first detailed history of Turing's contributions to computer science, this text is essential reading for anyone interested in the history of the computer and the history of mathematics. It contains first hand accounts by Turing and by the pioneers of computing who worked with him. As well as relating the story of the invention of the computer, the book clearly describes the hardware and software of the ACE--including the very first computer programs. The book is intended to be accessible to everyone with an interest in computing, and contains numerous diagrams and illustrations as well as original photographs. The book contains chapters describing Turing's path-breaking research in the fields of Artificial Intelligence (AI) and Artificial Life (A-Life). The book has an extensive system of hyperlinks to The Turing Archive for the History of Computing, an on-line library of digital facsimiles of typewritten documents by Turing and the other scientists who pioneered the electronic computer.

Spring 1940: The Battle of the Atlantic rages. Vulnerable merchant convoys are at the mercy of German U-boats controlled by a cunning system of coded messages created by a machine called Enigma. Only one man believes that these codes can be broken - mathematician and Bletchley Park cryptanalyst Alan Turing. Winston Churchill later described Turing's success in breaking the Enigma codes as the single biggest contribution to victory against Nazi Germany. Unheralded during his lifetime, Turing is now recognized as the father of modern computer science and as possessing one of the greatest minds of the 20th century. Drawing on original source material, interviews and photographs, this book explores Turing's groundbreaking work as well as revealing the private side of a complex and unlikely national hero.

This book presents a set of historical recollections on the work of Martin Davis and his role in advancing our understanding of the connections between logic, computing, and unsolvability. The individual contributions touch on most of the core aspects of Davis' work and set it in a contemporary context. They analyse, discuss and develop many of the ideas and concepts that Davis put forward, including such issues as contemporary satisfiability solvers, essential unification, quantum computing and generalisations of Hilbert's tenth problem. The book starts out with a scientific autobiography by Davis, and ends with his responses to comments included in the contributions. In addition, it includes two previously unpublished original historical papers in which Davis and Putnam investigate the decidable and the undecidable side of Logic, as well as a full bibliography of Davis' work. As a whole, this book shows how Davis' scientific work lies at the intersection of computability, theoretical computer science, foundations of mathematics, and philosophy, and draws its unifying vision from his deep involvement in Logic.

In 1936, when he was just twenty-four years old, Alan Turing wrote a remarkable paper in which he outlined the theory of computation, laying out the ideas that underlie all modern computers. This groundbreaking and powerful theory now forms the basis of computer science. In *Turing's Vision*, Chris Bernhardt explains the theory, Turing's most important contribution, for the general reader. Bernhardt argues that the strength of Turing's theory is its simplicity, and that, explained in a straightforward manner, it is eminently understandable by the nonspecialist. As Marvin Minsky writes, "The sheer simplicity of the theory's foundation and extraordinary short path from this foundation to its logical and surprising conclusions give the theory a mathematical beauty that alone guarantees it a permanent place in computer theory." Bernhardt begins with the foundation and systematically builds to the surprising conclusions. He also views Turing's theory in the context of mathematical history, other views of computation (including those of Alonzo Church), Turing's later work, and the birth of the modern computer. In the paper, "On Computable Numbers, with an Application to the Entscheidungsproblem," Turing thinks carefully about how humans perform computation, breaking it down into a sequence of steps, and then constructs theoretical machines capable of performing each step. Turing wanted to show that there were problems that were beyond any computer's ability to solve; in particular, he wanted to find a decision problem that he could prove was undecidable. To explain Turing's ideas, Bernhardt examines three well-known decision problems to explore the concept of undecidability; investigates theoretical computing machines, including Turing machines; explains universal machines; and proves that certain problems are undecidable,

including Turing's problem concerning computable numbers.

"In a short life he accomplished much, and to the roll of great names in the history of his particular studies added his own.' So is described one of the greatest figures of the twentieth century, yet Alan Turing's name was not widely recognised until his contribution to the breaking of the German Enigma code became public in the 1970s. The story of Turing's life fascinates and in the years since his suicide, Turing's reputation has only grown, as his contributions to logic, mathematics, computing, artificial intelligence and computational biology have become better appreciated. To commemorate the centenary of Turing's birth, this republication of his mother's biography is enriched by a new foreword by Martin Davis and a never-before-published memoir by Alan's older brother. The contrast between this memoir and the original biography reveals tensions and sheds new light on Turing's relationship with his family, and on the man himself"--

Everyone knows the story of the codebreaker and computer science pioneer Alan Turing. Except ... When Dermot Turing is asked about his famous uncle, people want to know more than the bullet points of his life. They want to know everything – was Alan Turing actually a codebreaker? What did he make of artificial intelligence? What is the significance of Alan Turing's trial, his suicide, the Royal Pardon, the £50 note and the film *The Imitation Game*? In *Reflections of Alan Turing*, Dermot strips off the layers to uncover the real story. It's time to discover a fresh legacy of Alan Turing for the twenty-first century.

Can you tell the difference between talking to a human and talking to a machine? Or, is it possible to create a machine which is able to converse like a human? In fact, what is it that even makes us human? Turing's *Imitation Game*, commonly known as the Turing Test, is fundamental to the science of artificial intelligence. Involving an interrogator conversing with hidden identities, both human and machine, the test strikes at the heart of any questions about the capacity of machines to behave as humans. While this subject area has shifted dramatically in the last few years, this book offers an up-to-date assessment of Turing's *Imitation Game*, its history, context and implications, all illustrated with practical Turing tests. The contemporary relevance of this topic and the strong emphasis on example transcripts makes this book an ideal companion for undergraduate courses in artificial intelligence, engineering or computer science. Alan Turing, pioneer of computing and WWII codebreaker, is one of the most important and influential thinkers of the twentieth century. In this volume for the first time his key writings are made available to a broad, non-specialist readership. They make fascinating reading both in their own right and for their historic significance: contemporary computational theory, cognitive science, artificial intelligence, and artificial life all spring from this ground-breaking work, which is also rich in philosophical and logical insight. An introduction by leading Turing expert Jack Copeland provides the background and guides the reader through the selection. About Alan Turing Alan Turing FRS OBE, (1912-1954) studied mathematics at King's College, Cambridge. He was elected a Fellow of King's in March 1935, at the age of only 22. In the same year he invented the abstract computing machines - now known simply as Turing machines - on which all subsequent stored-program digital computers are modelled. During 1936-1938 Turing continued his studies, now at Princeton University. He completed a PhD in mathematical logic, analysing the notion of 'intuition' in mathematics and

introducing the idea of oracular computation, now fundamental in mathematical recursion theory. An 'oracle' is an abstract device able to solve mathematical problems too difficult for the universal Turing machine. In the summer of 1938 Turing returned to his Fellowship at King's. When WWII started in 1939 he joined the wartime headquarters of the Government Code and Cypher School (GC&CS) at Bletchley Park, Buckinghamshire. Building on earlier work by Polish cryptanalysts, Turing contributed crucially to the design of electro-mechanical machines ('bombes') used to decipher Enigma, the code by means of which the German armed forces sought to protect their radio communications. Turing's work on the version of Enigma used by the German navy was vital to the battle for supremacy in the North Atlantic. He also contributed to the attack on the cyphers known as 'Fish'. Based on binary teleprinter code, Fish was used during the latter part of the war in preference to morse-based Enigma for the encryption of high-level signals, for example messages from Hitler and other members of the German High Command. It is estimated that the work of GC&CS shortened the war in Europe by at least two years. Turing received the Order of the British Empire for the part he played. In 1945, the war over, Turing was recruited to the National Physical Laboratory (NPL) in London, his brief to design and develop an electronic computer - a concrete form of the universal Turing machine. Turing's report setting out his design for the Automatic Computing Engine (ACE) was the first relatively complete specification of an electronic stored-program general-purpose digital computer. Delays beyond Turing's control resulted in NPL's losing the race to build the world's first working electronic stored-program digital computer - an honour that went to the Royal Society Computing Machine Laboratory at Manchester University, in June 1948. Discouraged by the delays at NPL, Turing took up the Deputy Directorship of the Royal Society Computing Machine Laboratory in that year. Turing was a founding father of modern cognitive science and a leading early exponent of the hypothesis that the human brain is in large part a digital computing machine, theorising that the cortex at birth is an 'unorganised machine' which through 'training' becomes organised 'into a universal machine or something like it'. He also pioneered Artificial Intelligence. Turing spent the rest of his short career at Manchester University, being appointed to a specially created Readership in the Theory of Computing in May 1953. He was elected a Fellow of the Royal Society of London in March 1951 (a high honour).

Written by a distinguished cast of contributors, *Alan Turing: Life and Legacy of a Great Thinker* is the definitive collection of essays in commemoration of the 90th birthday of Alan Turing. This fascinating text covers the rich facets of his life, thoughts, and legacy, but also sheds some light on the future of computing science with a chapter contributed by visionary Ray Kurzweil, winner of the 1999 National Medal of Technology. Further, important contributions come from the philosopher Daniel Dennett, the Turing biographer Andrew Hodges, and from the distinguished logician Martin Davis, who provides a first critical essay on an emerging and controversial field termed "hypercomputation".

"So is described one of the greatest figures of the twentieth century, yet someone who was barely known beyond mathematical corridors till the revelations in the 1970s. It was then that Alan Turing's critical contributions to the breaking of the German Enigma code, along with the circumstances of his suicide at the height

of his powers, became widely known. From the rather odd, precocious, gauche boy through an adolescence in which his mathematical ability began to blossom, to the achievements of his maturity, the story of Turing's life fascinates. In the years since his suicide, Turing's reputation has only grown, as his contributions to logic, mathematics, computing, artificial intelligence and computational biology have become better appreciated. To commemorate the centenary of Turing's birth, this republication of his mother's biography, unavailable for many years, is enriched by a new foreword by Martin Davis and a never-before published memoir by Alan's older brother, which sheds new light on Alan's relationship with his family, and on the man himself"--

The breathtakingly rapid pace of change in computing makes it easy to overlook the pioneers who began it all. Written by Martin Davis, respected logician and researcher in the theory of computation, *The Universal Computer: The Road from Leibniz to Turing* explores the fascinating lives, ideas, and discoveries of seven remarkable mathematicians. It tells the stories of the unsung heroes of the computer age – the logicians. The story begins with Leibniz in the 17th century and then focuses on Boole, Frege, Cantor, Hilbert, and Gödel, before turning to Turing. Turing's analysis of algorithmic processes led to a single, all-purpose machine that could be programmed to carry out such processes—the computer. Davis describes how this incredible group, with lives as extraordinary as their accomplishments, grappled with logical reasoning and its mechanization. By investigating their achievements and failures, he shows how these pioneers paved the way for modern computing. Bringing the material up to date, in this revised edition Davis discusses the success of the IBM Watson on Jeopardy, reorganizes the information on incompleteness, and adds information on Konrad Zuse. A distinguished prize-winning logician, Martin Davis has had a career of more than six decades devoted to the important interface between logic and computer science. His expertise, combined with his genuine love of the subject and excellent storytelling, make him the perfect person to tell this story.

In a short life he accomplished much, and to the roll of great names in the history of his particular studies added his own.' So is described one of the greatest figures of the twentieth century, yet Alan Turing's name was not widely recognised until his contribution to the breaking of the German Enigma code became public in the 1970s. The story of Turing's life fascinates and in the years since his suicide, Turing's reputation has only grown, as his contributions to logic, mathematics, computing, artificial intelligence and computational biology have become better appreciated. To commemorate the centenary of Turing's birth, this republication of his mother's biography is enriched by a new foreword by Martin Davis and a never-before-published memoir by Alan's older brother. The contrast between this memoir and the original biography reveals tensions and sheds new light on Turing's relationship with his family, and on the man himself.

Alan Turing: code-breaker, mathematician, father of modern computing. Award-winning children's author, Joanna Nadin, explores the extraordinary life of code-

cracking genius, Alan Turing. A Life Story: This gripping series throws the reader directly into the lives of modern society's most influential figures. With striking black-and-white illustration along with timelines and never-heard-before facts. Also in the series: Katherine Johnson: A Life Story Stephen Hawking: A Life Story Rosalind Franklin: A Life Story

Trained in both classics and computer science, Bolter considers the cultural impact of computers on our age, comparing the computer to earlier technologies that redefined fundamental notions of time, space, language, memory, and human creativity. Surprisingly, he finds that in many ways the outlook of the computer age bears more resemblance to that of the ancient world than to that of the Enlightenment. The classical philosopher and the computer programmer share share a suspicion of infinity, an acceptance of necessary limitations on human achievement, and a belief that results are more important than motives. Although Bolter fears that the growing use of computers may well diminish out culture's sense of the historical and intellectual context of human endeavor, he contends that the computer also offers new ways of looking at intellectual freedom, creativity, and the conservation of precious resources.

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