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computer programming, and on the problem -solving and logical- mathematical thinking skills of students This study was a semi-experimental, pretest-posttest study with two experimental groups and a control groups A total of 75 students were divided among all

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Math CountS column is Allan Stavely, who recently wrote Programming and Mathematical Thinking: A Gentle Introduction Featuring Python [2], which will be available in early 2014. In this column ...

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Programming And Mathematical Thinking

Programming and mathematical thinking: a gentle introduction to discrete math featuring Python / Allan M. Stavelly. xii, 246 p.: ill. ; 28 cm ISBN 978-1-938159-00-8 (pbk.) — 978-1-938159-01-5 (ebook) 1. Computer science — Mathematics. 2. Mathematics — Discrete Mathematics. 3. Python (Computer program language). QA 76.9 .M35 .S79 2014 004-dc22

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The experiment consisted of two different phases, a programming phase linked to the instruction in Scratch and focused on the acquisition of basic concepts of

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computational thinking (sequences, iterations, conditionals, and events-handling), and a mathematical phase completely oriented towards the resolution of mathematical tasks. In particular, the mathematical phase focused on word problems whose resolution involves the use of the least common multiple and the greatest common divisor.

Computational thinking and mathematics using Scratch: an ...

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Programming and Mathematical Thinking: A Gentle ...

Programming and mathematical thinking Henderson, Peter B.; Stavely, Allan M. 2014-03-01 00:00:00 INSI G HTS MATH COUNTS Peter B. Henderson
Programming and Mathematical Thinking Editor's Note: Peter B. Henderson and Allan M. Stavely co-authored this column OUR GUEST CONTRIBUTOR for this Math CountS column is Allan Stavely, who recently wrote Programming and Mathematical Thinking: A Gentle ...

Programming and mathematical thinking, ACM Inroads | 10 ...

We need it everyday, in our daily activities. But when you 're a programmer or a

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problem solver you need the mathematics most. Because math simply make a person more logical, creative and intelligence. To be a better programmer one must know at least a very little of Discrete Mathematics, Linear Algebra, Calculus, Probability, Cryptography, Geometry and Statistics.

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accurate to say that problem-solving and logicalmathematical thinking skills are essential for programming - education. To ensure that students perform well in computer programming, they first need to develop their problem-solving and logical-mathematical thinking skills, which can be achieved by studying and learning programming.

The Effect of Scratch- and Lego Mindstorms Ev3-Based ...

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Programming and Mathematical Thinking: A Gentle ...

In many ways discrete mathematics is more relevant to programming than numerical mathematics is: not just to particular kinds of programming, but to all programming. Many experienced programmers approach the design of a program by describing its input, output, and internal data objects in the vocabulary of discrete mathematics:

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sets, sequences, mappings, relations, and so on.

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Mathematical thinking is crucial in all areas of computer science: algorithms, bioinformatics, computer graphics, data science, machine learning, etc. In this course, we will learn the most important tools used in discrete mathematics: induction, recursion, logic, invariants, examples, optimality. We will use these tools to answer typical programming questions like: How can we be certain a solution exists?

Mathematical Thinking in Computer Science | Coursera

Computer programming helps to develop investigation skills as it requires the use of a previously unknown language to execute commands, which also develops the skills of mathematical thinking (ta). Computer programming also involves the use of modelling and planning techniques. Because Scratch is an open source programming language, this also creates opportunities for homework, as the children are able to download the software for themselves at home. ICT: Creating Instructional Videos

Teaching approaches: Mathematical thinking - OER in Education

Programming requires a way of thinking that isn't directly analogous to mathematics. The ability to visualize data structures, decompose big problems into smaller problems, and think in terms of objects and functional abstractions. This doesn't naturally follow from mathematical thinking.

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Aimed at teaching mathematics students how to program using their knowledge of mathematics, the entire book's emphasis is on "how to think" when programming. Three methods for constructing an algorithm or a program are used: manipulation and enrichment of existing code; use of recurrent sequences; deferral of code writing, in order to deal with one difficulty at a time. Many theorems are mathematically proved and programmed, and the text concludes with an explanation of how a compiler works and how to compile "by hand" little programs. Intended for anyone who thinks mathematically and wants to program and play with mathematics.

In *Math for Programmers* you'll explore important mathematical concepts through hands-on coding. Filled with graphics and more than 300 exercises and mini-projects, this book unlocks the door to interesting – and lucrative! – careers in some of today's hottest fields. As you tackle the basics of linear algebra, calculus, and machine learning, you'll master the key Python libraries used to turn them into real-world software applications. Summary To score a job in data science, machine learning, computer graphics, and cryptography, you need to bring strong math skills to the party. *Math for Programmers* teaches the math you need for these hot careers,

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concentrating on what you need to know as a developer. Filled with lots of helpful graphics and more than 200 exercises and mini-projects, this book unlocks the door to interesting – and lucrative! – careers in some of today ' s hottest programming fields. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the technology Skip the mathematical jargon: This one-of-a-kind book uses Python to teach the math you need to build games, simulations, 3D graphics, and machine learning algorithms. Discover how algebra and calculus come alive when you see them in code! About the book In Math for Programmers you ' ll explore important mathematical concepts through hands-on coding. Filled with graphics and more than 300 exercises and mini-projects, this book unlocks the door to interesting – and lucrative! – careers in some of today ' s hottest fields. As you tackle the basics of linear algebra, calculus, and machine learning, you ' ll master the key Python libraries used to turn them into real-world software applications. What's inside Vector geometry for computer graphics Matrices and linear transformations Core concepts from calculus Simulation and optimization Image and audio processing Machine learning algorithms for regression and classification About the reader For programmers with basic skills in algebra. About the author Paul Orland is a programmer, software entrepreneur, and math enthusiast. He is co-founder of Tachyus, a start-up building predictive analytics software for the energy industry. You can find him online at www.paulorland.com. Table of Contents 1 Learning math with code PART I - VECTORS AND GRAPHICS 2 Drawing with 2D vectors 3 Ascending to the 3D world 4 Transforming vectors and graphics 5 Computing

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transformations with matrices 6 Generalizing to higher dimensions 7 Solving systems of linear equations PART 2 - CALCULUS AND PHYSICAL SIMULATION 8 Understanding rates of change 9 Simulating moving objects 10 Working with symbolic expressions 11 Simulating force fields 12 Optimizing a physical system 13 Analyzing sound waves with a Fourier series PART 3 - MACHINE LEARNING APPLICATIONS 14 Fitting functions to data 15 Classifying data with logistic regression 16 Training neural networks

This book constitutes the refereed proceedings of the 10th European Conference on Technology Enhanced Learning, EC-TEL 2015, held in Toledo, Spain, in September 2015. The 27 full papers, 19 short papers, 9 demo papers and 23 posters were carefully reviewed and selected from 176 submissions. They address topics such as blended learning; self-regulated and self directed learning; reflective learning; intelligent learning systems; learning communities; learning design; learning analytics; learning assessment; personalization and adaptation; serious games; social media; massive open online courses (MOOCs); schools of the future.

In the twenty-first century, everyone can benefit from being able to think mathematically. This is not the same as "doing math." The latter usually involves the application of formulas, procedures, and symbolic manipulations; mathematical thinking is a powerful way of thinking about things in the world -- logically, analytically, quantitatively, and with precision. It is not a natural way of thinking, but

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it can be learned. Mathematicians, scientists, and engineers need to "do math," and it takes many years of college-level education to learn all that is required. Mathematical thinking is valuable to everyone, and can be mastered in about six weeks by anyone who has completed high school mathematics. Mathematical thinking does not have to be about mathematics at all, but parts of mathematics provide the ideal target domain to learn how to think that way, and that is the approach taken by this short but valuable book. The book is written primarily for first and second year students of science, technology, engineering, and mathematics (STEM) at colleges and universities, and for high school students intending to study a STEM subject at university. Many students encounter difficulty going from high school math to college-level mathematics. Even if they did well at math in school, most are knocked off course for a while by the shift in emphasis, from the K-12 focus on mastering procedures to the "mathematical thinking" characteristic of much university mathematics. Though the majority survive the transition, many do not. To help them make the shift, colleges and universities often have a "transition course." This book could serve as a textbook or a supplementary source for such a course. Because of the widespread applicability of mathematical thinking, however, the book has been kept short and written in an engaging style, to make it accessible to anyone who seeks to extend and improve their analytic thinking skills. Going beyond a basic grasp of analytic thinking that everyone can benefit from, the STEM student who truly masters mathematical thinking will find that college-level mathematics goes from being confusing, frustrating, and at times seemingly impossible, to making sense and

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being hard but doable. Dr. Keith Devlin is a professional mathematician at Stanford University and the author of 31 previous books and over 80 research papers. His books have earned him many awards, including the Pythagoras Prize, the Carl Sagan Award, and the Joint Policy Board for Mathematics Communications Award. He is known to millions of NPR listeners as "the Math Guy" on Weekend Edition with Scott Simon. He writes a popular monthly blog "Devlin's Angle" for the Mathematical Association of America, another blog under the name "profkeithdevlin", and also blogs on various topics for the Huffington Post.

The true story that inspired the 2020 film. The autobiography of mathematician Stanislaw Ulam, one of the great scientific minds of the twentieth century, tells a story rich with amazingly prophetic speculations and peppered with lively anecdotes. As a member of the Los Alamos National Laboratory from 1944 on, Ulam helped to precipitate some of the most dramatic changes of the postwar world. He was among the first to use and advocate computers for scientific research, originated ideas for the nuclear propulsion of space vehicles, and made fundamental contributions to many of today's most challenging mathematical projects. With his wide-ranging interests, Ulam never emphasized the importance of his contributions to the research that resulted in the hydrogen bomb. Now Daniel Hirsch and William Mathews reveal the true story of Ulam's pivotal role in the making of the "Super," in their historical introduction to this behind-the-scenes look at the minds and ideas that ushered in the nuclear age. An epilogue by Fran ç oise Ulam and Jan Mycielski sheds new light on

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Ulam's character and mathematical originality.

Answer set programming (ASP) is a programming methodology oriented towards combinatorial search problems. In such a problem, the goal is to find a solution among a large but finite number of possibilities. The idea of ASP came from research on artificial intelligence and computational logic. ASP is a form of declarative programming: an ASP program describes what is counted as a solution to the problem, but does not specify an algorithm for solving it. Search is performed by sophisticated software systems called answer set solvers. Combinatorial search problems often arise in science and technology, and ASP has found applications in diverse areas—in historical linguistics, in bioinformatics, in robotics, in space exploration, in oil and gas industry, and many others. The importance of this programming method was recognized by the Association for the Advancement of Artificial Intelligence in 2016, when AI Magazine published a special issue on answer set programming. The book introduces the reader to the theory and practice of ASP. It describes the input language of the answer set solver CLINGO, which was designed at the University of Potsdam in Germany and is used today by ASP programmers in many countries. It includes numerous examples of ASP programs and presents the mathematical theory that ASP is based on. There are many exercises with complete solutions.

Doing Math with Python shows you how to use Python to delve into high school – level

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math topics like statistics, geometry, probability, and calculus. You ' ll start with simple projects, like a factoring program and a quadratic-equation solver, and then create more complex projects once you ' ve gotten the hang of things. Along the way, you ' ll discover new ways to explore math and gain valuable programming skills that you ' ll use throughout your study of math and computer science. Learn how to:

- Describe your data with statistics, and visualize it with line graphs, bar charts, and scatter plots
- Explore set theory and probability with programs for coin flips, dicing, and other games of chance
- Solve algebra problems using Python ' s symbolic math functions
- Draw geometric shapes and explore fractals like the Barnsley fern, the Sierpinski triangle, and the Mandelbrot set
- Write programs to find derivatives and integrate functions

Creative coding challenges and applied examples help you see how you can put your new math and coding skills into practice. You ' ll write an inequality solver, plot gravity ' s effect on how far a bullet will travel, shuffle a deck of cards, estimate the area of a circle by throwing 100,000 "darts" at a board, explore the relationship between the Fibonacci sequence and the golden ratio, and more. Whether you ' re interested in math but have yet to dip into programming or you ' re a teacher looking to bring programming into the classroom, you ' ll find that Python makes programming easy and practical. Let Python handle the grunt work while you focus on the math. Uses Python 3

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Programming Language Pragmatics, Fourth Edition, is the most comprehensive programming language textbook available today. It is distinguished and acclaimed for its integrated treatment of language design and implementation, with an emphasis on the fundamental tradeoffs that continue to drive software development. The book provides readers with a solid foundation in the syntax, semantics, and pragmatics of the full range of programming languages, from traditional languages like C to the latest in functional, scripting, and object-oriented programming. This fourth edition has been heavily revised throughout, with expanded coverage of type systems and functional programming, a unified treatment of polymorphism, highlights of the newest language standards, and examples featuring the ARM and x86 64-bit architectures. Updated coverage of the latest developments in programming language design, including C & C++11, Java 8, C# 5, Scala, Go, Swift, Python 3, and HTML 5 Updated treatment of functional programming, with extensive coverage of OCaml New chapters devoted to type systems and composite types Unified and updated treatment of polymorphism in all its forms New examples featuring the ARM and x86 64-bit architectures

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