

Solution:

Let $P(n) := \frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \cdots + \frac{1}{n(n+1)} = \frac{n}{n+1}$. Substituting the value of $n = 1$, in the statement we get, $P(1) = \frac{1}{1.2} = \frac{1}{2}$. Hence, $P(1)$ is true. Let us assume that the statement is true for $n = k$. Then

$$P(k) = \frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \cdots + \frac{1}{k(k+1)} = \frac{k}{k+1}.$$

We need to show that $P(k+1)$ is true. Consider,

$$\begin{aligned} P(k+1) &= \underbrace{\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \cdots + \frac{1}{k(k+1)}}_1 + \frac{1}{(k+1)(k+2)} \\ &= P(k) + \frac{1}{(k+1)(k+2)} \\ &= \frac{k}{k+1} + \frac{1}{(k+1)(k+2)} \\ &= \frac{1}{k+1} \left(\frac{k}{1} + \frac{1}{k+2} \right) \\ &= \frac{1}{k+1} \left(\frac{k^2 + 2k + 1}{k+2} \right) \\ &= \frac{1}{k+1} \left(\frac{(k+1)^2}{k+2} \right) = \frac{(k+1)}{(k+2)}. \end{aligned}$$

This implies, $P(k+1)$ is true. The validity of $P(k+1)$ follows from that of $P(k)$. Therefore, by the principle of mathematical induction, for any natural number n ,

$$\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \cdots + \frac{1}{n(n+1)} = \frac{n}{n+1}.$$

Mathematical Induction Problems And Solutions

Yuefan Deng



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difficult to find such a large comprehensive array of well written and demonstrative practice problems which makes this all the more valuable a resource Duc Van Khanh Tran carefully pens each solution to be as intuitive and explanatory as possible so the risk of confusion at a solution is minimal The vast amount of problems is complemented by the vast array of topics the book covers Inequalities sequences trigonometry power series derivatives and integrals are only some of the concepts found guaranteeing that anyone interested in math will get something new out of this book I've tried a few of these for fun I really like the integral problems myself All in all if you'd like to learn about induction hone your induction skills or just want a bunch of fun induction problems purchase away You won't regret it Said Kaili Undergraduate Student of Mathematics University of Virginia Despite minimal prior proof background I can grasp the main scopes of the book without much difficulty Indeed Duc Tran's book provides clear instructions comprehensive content and helpful problems that ease students into learning mathematical induction Ky Minh Vinh Nguyen Undergraduate Student of Informatics University of Texas at Austin Lectures, Problems And Solutions For Ordinary Differential Equations (Second Edition) Yuefan Deng, 2017-08-11

This unique book on ordinary differential equations addresses practical issues of composing and solving differential equations by demonstrating the detailed solutions of more than 1 000 examples The initial draft was used to teach more than 10 000 advanced undergraduate students in engineering physics economics as well as applied mathematics It is a good source for students to learn problem solving skills and for educators to find problems for homework assignments and tests The 2nd edition with at least 100 more examples and five added subsections has been restructured to flow more pedagogically *Expanding Mathematical Toolbox: Interweaving Topics, Problems, and Solutions* Boris Pritsker, 2023-02-08 Expanding Mathematical Toolbox Interweaving Topics Problems and Solutions offers several topics from different mathematical disciplines and shows how closely they are related The purpose of this book is to direct the attention of readers who have an interest in and talent for mathematics to engaging and thought provoking problems that should help them change their ways of thinking entice further exploration and possibly lead to independent research and projects in mathematics In spite of the many challenging problems most solutions require no more than a basic knowledge covered in a high school math curriculum To shed new light on a deeper appreciation for mathematical relationships the problems are selected to demonstrate techniques involving a variety of mathematical ideas Included are some interesting applications of trigonometry vector algebra and Cartesian coordinate system techniques and geometrical constructions and inversion in solving mechanical engineering problems and in studying models explaining non Euclidean geometries This book is primarily directed at secondary school teachers and college professors It will be useful in teaching mathematical reasoning because it emphasizes how to teach students to think creatively and strategically and how to make connections between math disciplines The text also can be used as a resource for preparing for mathematics Olympiads In addition it is aimed at all readers who want to study mathematics gain deeper understanding and enhance their problem solving abilities Readers will

find fresh ideas and topics offering unexpected insights new skills to expand their horizons and an appreciation for the beauty of mathematics

Problems And Solutions In Introductory And Advanced Matrix Calculus (Second Edition) Yorick Hardy, Willi-hans Steeb, 2016-07-14 This book provides an extensive collection of problems with detailed solutions in introductory and advanced matrix calculus Supplementary problems in each chapter will challenge and excite the reader ideal for both graduate and undergraduate mathematics and theoretical physics students The coverage includes systems of linear equations linear differential equations integration and matrices Kronecker product and vec operation as well as functions of matrices Furthermore specialized topics such as spectral theorem nonnormal matrices and mutually unbiased bases are included Many of the problems are related to applications for group theory Lie algebra theory wavelets graph theory and matrix valued differential forms benefitting physics and engineering students and researchers alike It also branches out to problems with tensors and the hyperdeterminant Computer algebra programs in Maxima and SymbolicC have also been provided

Excel HSC Maths Extension 1 S. K. Patel, 2005 This comprehensive study guide covers the complete HSC Maths Extension 1 course and has been specifically created to maximise exam success This guide has been designed to meet all study needs providing up to date information in an easy to use format Excel HSC Maths Extension 1 includes free HSC study cards for revision on the go or at home comprehensive topic by topic summaries of the course preliminary course topics covered in detail illustrated examples of each type of question self testing questions to reinforce what you have just learned fully worked solutions for every problem chapter summaries for pre exam revision icons and boxes to highlight key ideas and words four complete trial HSC exam papers with worked solutions extra questions with answers

Learning Through Teaching Mathematics Roza Leikin, Rina Zazkis, 2010-04-10 The idea of teachers Learning through Teaching LTT when presented to a naive bystander appears as an oxymoron Are we not supposed to learn before we teach After all under the usual circumstances learning is the task for those who are being taught not of those who teach However this book is about the learning of teachers not the learning of students It is an ancient wisdom that the best way to truly learn something is to teach it to others Nevertheless once a teacher has taught a particular topic or concept and consequently truly learned it what is left for this teacher to learn As evident in this book the experience of teaching presents teachers with an exciting opportunity for learning throughout their entire career This means acquiring a better understanding of what is being taught and moreover learning a variety of new things What these new things may be and how they are learned is addressed in the collection of chapters in this volume LTT is acknowledged by multiple researchers and mathematics educators In the first chapter Leikin and Zazkis review literature that recognizes this phenomenon and stress that only a small number of studies attend systematically to LTT processes The authors in this volume purposefully analyze the teaching of mathematics as a source for teachers own learning

Resources for Teaching Discrete Mathematics Brian Hopkins, 2009 Hopkins collects the work of 35 instructors who share their innovations and insights about teaching discrete

mathematics at the high school and college level The book s 9 classroom tested projects including building a geodesic dome come with student handouts solutions and notes for the instructor The 11 history modules presented draw on original sources such as Pascal s Treatise on the Arithmetical Triangle allowing students to explore topics in their original contexts Three articles address extensions of standard discrete mathematics content Two other articles explore pedagogy specifically related to discrete mathematics courses adapting a group discovery method to larger classes and using logic in encouraging students to construct proofs

Problems and Solutions in Biological Sequence Analysis Mark Borodovsky,Svetlana Ekisheva,2006-09-04 This book is the first of its kind to provide a large collection of bioinformatics problems with accompanying solutions Notably the problem set includes all of the problems offered in Biological Sequence Analysis by Durbin et al Cambridge 1998 widely adopted as a required text for bioinformatics courses at leading universities worldwide Although many of the problems included in Biological Sequence Analysis as exercises for its readers have been repeatedly used for homework and tests no detailed solutions for the problems were available Bioinformatics instructors had therefore frequently expressed a need for fully worked solutions and a larger set of problems for use on courses This book provides just that following the same structure as Biological Sequence Analysis and significantly extending the set of workable problems it will facilitate a better understanding of the contents of the chapters in BSA and will help its readers develop problem solving skills that are vitally important for conducting successful research in the growing field of bioinformatics All of the material has been class tested by the authors at Georgia Tech where the first ever MSc degree program in Bioinformatics was held

Group Theory In Physics: Problems And Solutions Michael Aivazis,Wu-ki Tung,1991-06-25 This solutions booklet is a supplement to the text book Group Theory in Physics by Wu Ki Tung It will be useful to lecturers and students taking the subject as detailed solutions are given

The American Mathematical Monthly ,1921 Includes section Recent publications

School Mathematics Textbooks In China: Comparative Studies And Beyond Jianpan Wang,Lianghuo Fan,Binyan Xu,2021-01-28 Our collected work contains mathematics education research papers Comparative studies of school textbooks cover content selection compilation style representation method design of examples and exercises mathematics investigation the use of information technology and composite difficulty level to name a few Other papers included are about representation of basic mathematical thought in school textbooks a study on the compilation features of elementary school textbooks and a survey of the effect of using new elementary school textbooks

Algorithm Design: A Methodological Approach - 150 problems and detailed solutions Patrick Bosc,Marc Guyomard,Laurent Miclet,2023-01-31 A bestseller in its French edition this book is original in its construction and its success in the French market demonstrates its appeal It is based on three principles 1 An organization of the chapters by families of algorithms exhaustive search divide and conquer etc On the contrary there is no chapter devoted only to a systematic exposure of say algorithms on strings Some of these will be found in different chapters 2 For each family of algorithms an introduction is given to the mathematical

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Hughes,2013-11-26 covers latest MOE syllabus comprehensive examples and solutions for quick revision helps students to familiarise with various exam question types complete edition and concise edition eBooks available **Lectures in Applied Mathematics and Informatics** Luigi M. Ricciardi,1990 A collection of selected lectures in applied mathematics delivered by visiting professors within the Research Doctorate Programme in Applied Mathematics and Informatics at the University of Naples Each lecture is a self contained chapter focusing on the latest issues in applied mathematics and informatics Emphasis is placed on computational aspects but very recent findings are discussed without excessive technical jargon

The Pre-calculus Problem Solver Max Fogiel,Research and Education Association,1984 *Solved Papers for Manipal Engineering 2021* Arihant Experts,2021-01-28 [Artificial Intelligence in Real-Time Control](#) 1994 A. Crespo,2014-06-28

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