An Introduction to Minimax Theorems and Their Applications to Differential Equations

Maria do Rosário Grossinho and Stepan Agup Tersian
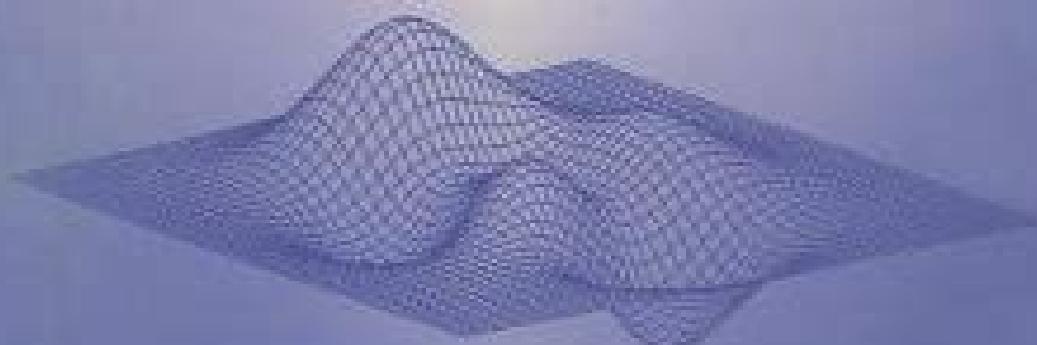
Minimax Theorems

Maurice Sion

Minimax Theorems:

Minimax Theorems Michel Willem,2012-12-06 Many boundary value problems are equivalent to Au O 1 where A X Y is a mapping between two Banach spaces When the problem is variational there exists a differentiable functional rand inf

Minimax and Applications Ding-Zhu Du,Panos M. Pardalos,2013-12-01 Techniques and principles of minimax theory play a key role in many areas of research including game theory optimization and computational complexity In general a minimax problem can be formulated as min max f x y 1 EX lEY where f x y is a function defined on the product of X and Y spaces There are two basic issues regarding minimax problems The first issue concerns the establishment of sufficient and necessary conditions for equality minmaxf x y maxminf x y 2 EX lEY lEY EX The classical minimax theorem of von Neumann is a result of this type Duality theory in linear and convex quadratic programming interprets minimax theory in a different way The second issue concerns the establishment of sufficient and necessary conditions for values of the variables x and y that achieve the global minimax function value f x y minmaxf x y 3 EX lEY There are two developments in minimax theory that we would like to mention *Minimax Theory and Applications* Biagio Ricceri,Stephen Simons,2013-06-29 The present volume contains the proceedings of the workshop on Minimax Theory and Applications that was held during the week 30 September 6 October 1996 at the G Stampacchia International School of Mathematics of the E Majorana Centre for Scientific Cul ture in Erice Italy The main theme of the workshop was minimax theory in its most classical meaning That is to say given a real valued function f on a product space X x Y one tries to find conditions that ensure the validity of the equality sup inf f x y inf sup f x y yEY xEX xEX yEY This is not an appropriate place to enter into the technical details of the proofs of minimax theorems or into the history of the contribu tions to the solution of this basic problem in the last 7 decades But we do want to stress its intrinsic interest and point out that in spite of its extremely simple formulation it conceals a great wealth of ideas This is clearly shown by the large variety of methods and tools that have been used to study it The applications of minimax theory are also extremely interesting In fact the need for the ability to switch quantifiers arises in a seemingly boundless range of different situations So the good quality of a minimax theorem can also be judged by its applicability We hope that this volume will offer a rather complete account of the state of the art of the subject **An Introduction to Minimax Theorems and Their Applications to Differential Equations** Maria do Rosário Grossinho,Stepan Agop Tersian,2013-06-29 The book is intended to be an introduction to critical point theory and its applications to differential equations Although the related material can be found in other books the authors of this volume have had the following goals in mind To present a survey of existing minimax theorems To give applications to elliptic differential equations in bounded domains To consider the dual variational method for problems with continuous and discontinuous nonlinearities To present some elements of critical point theory for locally Lipschitz functionals and give applications to fourth order differential equations with discontinuous nonlinearities To study homoclinic solutions of differential equations via the variational

methods The contents of the book consist of seven chapters each one divided into several sections Audience Graduate and post graduate students as well as specialists in the fields of differential equations variational methods and optimization

Minimax and Monotonicity Stephen Simons,2006-11-14 Focussing on the theory both classical and recent of monotone multifunctions on a possibly nonreflexive Banach space this book looks at the big convexification of a multifunction convex functions associated with a multifunction minimax theorems as a tool in functional analysis and convex analysis It includes new results on the existence of continuous linear functionals the conjugates biconjugates and subdifferentials of convex lower semicontinuous functions Fenchel duality possibly unbounded positive linear operators from a Banach space into its dual the sum of maximal monotone operators and a list of open problems The reader is expected to know basic functional analysis and calculus of variations including the Bahn Banach theorem Banach Alaoglu theorem Ekeland s variational principle **Minimax Theorems and Qualitative Properties of the Solutions of Hemivariational Inequalities** Dumitru Motreanu,P. D. Panagiotopoulos,1999 The present book is the first ever published in which a new type of eigenvalue problem is studied one that is very useful for applications eigenvalue problems related to hemivariational inequalities i e involving nonsmooth nonconvex energy functions New existence multiplicity and perturbation results are proved using three different approaches minimization minimax methods and sub critical point theory Nonresonant and resonant cases are studied both for static and dynamic problems and several new qualitative properties of the hemivariational inequalities are obtained Both simple and double eigenvalue problems are studied as well as those constrained on the sphere and those which are unconstrained The book is self contained is written with the utmost possible clarity and contains highly original results Applications concerning new stability results for beams plates and shells with adhesive supports etc illustrate the theory Audience applied and pure mathematicians civil aeronautical and mechanical engineers **Minimax Methods in Critical Point Theory with Applications to Differential Equations** Paul H. Rabinowitz,Conference Board of the Mathematical Sciences,1986-07-01 The book provides an introduction to minimax methods in critical point theory and shows their use in existence questions for nonlinear differential equations An expanded version of the author s 1984 CBMS lectures this volume is the first monograph devoted solely to these topics Among the abstract questions considered are the following the mountain pass and saddle point theorems multiple critical points for functionals invariant under a group of symmetries perturbations from symmetry and variational methods in bifurcation theory The book requires some background in functional analysis and differential equations especially elliptic partial differential equations It is addressed to mathematicians interested in differential equations and or nonlinear functional analysis particularly critical point theory **KKM Theory and Applications in Nonlinear Analysis** George Xian-Zhi Yuan,1999-02-09 This reference provides a lucid introduction to the principles and applications of Knaster Kuratowski Mazurkiewicz KKM theory and explores related topics in nonlinear set valued analysis *Introduction to Minimax* V. F. Dem'yanov,V. N. Malozemov,1990-01-01 Geared toward students of

mathematical programming this user friendly text offers a thorough introduction to the part of optimization theory that lies between approximation theory and mathematical programming 37 illustrations 1974 edition   **General Minimax Theorems** Maurice Sion,1957   Two Functions Minimax Theorems Feng-Shuo Yu,1997   **Encyclopedia of Optimization** Christodoulos A. Floudas,Panos M. Pardalos,2008-09-04 The goal of the Encyclopedia of Optimization is to introduce the reader to a complete set of topics that show the spectrum of research the richness of ideas and the breadth of applications that has come from this field The second edition builds on the success of the former edition with more than 150 completely new entries designed to ensure that the reference addresses recent areas where optimization theories and techniques have advanced Particularly heavy attention resulted in health science and transportation with entries such as Algorithms for Genomics Optimization and Radiotherapy Treatment Design and Crew Scheduling   Mathematical Statistics Aleksandr Petrovich Korostelev,Olga Korosteleva,2011 iPositive Give a man a fish he eats for a day but if you teach him to fish you feed him for life Such is the approach of iPositive One day at the gym doesnt make a person fit for life its a consistent dedication to getting the body in shape that eventually yields results The lessons in iPositive work in much the same way They challenge the reader to work to keep the mind in shape The book is a powerful guide to personal happiness through positivity Its concepts provide empowerment to overcome self doubt disbelief and inferiority complexes in order to transcend the negativity in life iPositive is geared toward helping individuals become more focused on the things they most want in life like happiness love and success or banish anchors that may be weighting them down like stress smoking or excess weight The book gives readers the practical means to become more focused on those things they want in life and serves as an inspirational manual for a life of fulfillment and strength in body mind and spirit   **MINIMAX THEOREMS** Ky Fan,1952   **Minimax Theorems Under Convexity Conditions** Albrecht Irle,1980   **Journal of Nonlinear and Convex Analysis** ,2006   **General Minimax Theorems** Maurice Sion,1957   **Selected Topics in Graph Theory** Lowell W. Beineke,Robin J. Wilson,1978   *Some minimax theorems* Frode Terkelsen,1972   **Proceedings of the National Academy of Sciences of the United States of America** National Academy of Sciences (U.S.),1915 The Proceedings of the National Academy of Sciences PNAS publishes research reports commentaries reviews colloquium papers and actions of the Academy PNAS is a multidisciplinary journal that covers the biological physical and social sciences

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