Introduction to Game Theory

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The opening sentence of the book under review says, "Game theory is a mathematical theory dealing with models of conflict and cooperation". So it is not surprising that ever since its formulation by Borel (1921) and von Neumann (1928), game theory has found applications in economics and more recently in evolutionary biology. Moreover the jargon as well as the growth of the subject has been influenced by economics. A high point of this connection is the work of Nash on game theory being awarded the Nobel prize in economics. Though not much of mathematical background is needed to appreciate the rudimentary aspects of the theory, the subtleties of the subject soon become mathematically demanding.

The book is an introductory text on game theory. The first nine chapters concern noncooperative games, with emphasis on existence and calculation of Nash equilibria. Two-person games are discussed in Chapters 3 and 4, while Chapter 5 gives Nash equilibria of a 3-person game. Interrelation between noncooperative game theory and branches of operations research like linear programming and linear complementarity problem are described in subsequent chapters. The last ten chapters treat different types of cooperative games like transferable utility games, nontransferable utility games and bargaining games. Economic models like linear production games are presented. Various solution concepts are introduced. While Shapley value and its axiomatization are given in Chapter 14, different bargaining solutions and their characterizations in the context of bargaining games are the contents of another well-written chapter.

Clear exposition of the concepts through appropriate examples and exercises are given. Applications in economics operations research are indicated throughout. An attractive feature is the large number of exercises with varying levels of difficulty. Solutions to most are indicated at the end of the book.

Some of the topics could have been elaborated upon a bit more. For instance, a short discussion in Chapter 7, perhaps through some examples, on how linear complementarity problem could be used in finding a Nash equilibrium would have been illuminating. Also the reader could have been directed to a book giving a proof of Brouwer's fixed point theorem.

On the whole, this is a well-written book. It can be used at senior undergraduate or graduate level in a course on Operations Research. It is also suitable for self study.

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