BOOK REVIEW

Introduction to the Mathematics of Operations Research, by Kevin J. Hastings,
Marcel-Dekkar, 1989, 407 pp., \$99.75, ISBN 0-8247-8039-6

This excellently written text makes me want to create a course to fit the book. Unfortunately, it would have a limited audience.

Students interested in operations research tend to come from engineering or computer science programs and the crisp, clean, precise mathematical style along with its concise notation will put off most of these students. Many of our students today seem to need constant affirmation of the immediate relevance of what they are being asked to learn and this book will be difficult for those students. Introductory examples are not fully developed and as a result will likely fail to provide the motivation for the typical student. This could be remedied by working out some of the exercises and using them as motivating examples.

I do not feel this text is appropriate for any of the courses I presently teach in the Operations Research Program but I would love to use it in a mathematics course for the well-motivated student using the book. It would be suitable for advanced undergraduate or graduate students and I can easily imagine a student who appreciates mathematics getting drawn into operations research by this text.

Although the exposition is mathematical, the author manages to give it a smooth, easy going flow. You feel he is talking to you, elaborating succinctly on some new definition, or introducing the next result with a lead-in sentence that whets your appetite. For example, just preceding Theorem 2.11 (p. 98) in which the relationship between basic feasible solutions and extreme points is given, he says,

“The following theorem provides the crucial connection between the geometry of linear programming problems and the algebraic solution of systems of linear equations, which is the heart of the algorithm to solve the problem.”

The collection of exercises is one of the principal strengths of the book. The burden, of course, is on the instructor to carefully choose those exercises that will fit his or her version of the

course. Depending on how you use the exercises, you can tailor the course towards an emphasis on proofs or on modeling.

Definitions, theorems, examples, and remarks are all clearly set out and easy to refer back to. The proofs are written to be understood by the reader and are not simply put there for completeness. The arguments are clear and concise and all steps are appropriately justified.

Another example of the author's concern for the reader is that any time he proves a result by contrapositive, he tips the reader off in advance.

The author wisely limits the breadth of the text. It is not a survey text, typical in introductory operations research courses. Instead, it provides an in-depth mathematical view of how and why things work in some representative areas: graph theory and networks, linear programming, Markov chains, continuous time process and dynamic programming. The author has decided to relegate certain important topics to the exercises, for example: big M method, the dual simplex and Hall's Theorem.

The probability review of Ch. 4 provides a solid support for the second half of the text. The author decides not to include certain proofs here but merely provides the results with some brief outline of the idea of the proof. This seems to be a good strategy in avoiding getting bogged down. The student sees these results put into action in later chapters.

As the author purports, this text does fill a need for a solid introduction to the mathematics of operations research. I intend to design a course for mathematics students using this as the text. My operations research students will be encouraged to take it but I won't be surprised if they decline.

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