Fascinating and authoritative, Chaos and Fractals: New Frontiers of Science is a truly remarkable book that documents recent discoveries in chaos theory with plenty of mathematical detail, but without alienating the general reader. In all, this text offers an extremely rich and engaging tour of this quite revolutionary branch of mathematical research. The most appealing aspect about Chaos and Fractals has to be its hundreds of images and graphics (with dozens in full-color) used to illustrate key concepts. Even the math-averse reader should be able to follow the basic presentation of chaos and fractals here. Since fractals often mimic natural shapes such as mountains, plants, and other biological forms, they lend themselves especially well to visual representation. Early chapters here document the mathematical oddities (or monsters) such as the Sierpinski Gasket and the Koch Curve, which laid the groundwork for later discoveries in fractals. The book does a fine job of placing recent discoveries about chaos into a tradition of earlier mathematical research. Its description of the work of mathematicians like Pascal, Kepler, Poincaré, Sierpinski, Koch, and Mandelbrot makes for a fine read, a detective story that ends with the discovery of order in chaos. (For programmers, the authors provide short algorithms and BASIC code, which lets you try out plotting various fractals on your own.) This is not, however, only a book of pretty pictures. For the reader who needs the mathematics behind chaos theory, the authors in no way dumb down the details. (But because the richer mathematical material is set off from the main text, the general reader can still make headway without getting lost.) There have been advances in the field since this book's publication in 1992, but Chaos and Fractals remains an authoritative general reference on chaos theory and fractals. A must for math students (and math enthusiasts), Chaos and Fractals also deserves a place on the bookshelf of any general reader or programmer who wants to understand how today's mathematicians and scientists make sense of our world using chaos theory.

--Richard Dragan

Topics covered: Overview of fractals and chaos theory, feedback and multiple reduction copy machines (MRCMs), the Cantor Set, the Sierpinski Gasket and Carpet, the Pascal Triangle, the Koch Curve, Julia Sets, similarity, measuring fractal curves, fractal dimensions, transformations and contraction mapping, image compression, chaos games, fractals and nature, L-systems, cellular automata basics, attractors and strange attractors, Henon Attractor, Rössler and Lorenz Attractors, randomness in fractals, the Brownian
motion, fractal landscapes, sensitivity and periodic points, complex arithmetic basics, the Mandelbrot Set, and multifractal measures.

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My Personal Review:
At least 50% of this book can be well understood by any 1st year, exact science student. There are a couple of mathematical issues that are more senior-like, but never mind. With the appropriate teaching or guidance, a lot of practical, advanced tasks can be tackled down. I could use this book all along for giving examples for college (university), undergraduate students of almost every mathematical subject: numerical analysis, calculus, linear algebra, group theory, algorithm theory, visualization in 2 and 3 dimensions, topology...you name it, after reading this book. No fuzzy theory or wavelets or any other advanced statistical method for dynamical systems is formally mentioned, though. However the concept of measure is very well introduced and described with examples. For physics is not bad for dynamical systems theory. Although no Hamiltonian or Lagrangian formalism is mentioned, the description on how to obtain Lyapunov exponents out of a set of differential equations is very good. Engineers get their share too: useful examples are given about, e.g., feedback and control theory (mind you, it is not a book specialized in, say, robotic control using chaos theory, but it is a good start). For philosophers and the layman there are quite a few pages as well. The foreword from Mitchel Feigenbaum, just to give an example, tells us a kind of summary which "warms up" the reader and "exorcises away" the possible fantasies an unprepared reader could have regarding (or against or in favor of) the word "chaos". Nice color plates for those with artistic inclinations and the graphics are just so very well printed, you can practically "follow" their computation. Not a bad book at all for your personal (or institutional) library, I may say.

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