SETS FOR MATHEMATICS, a review by Scott W. Williams

For the first half of my nearly four decades as a mathematician, it was clear to me that the language of mathematics was Set Theory and this had been the language for at least seventy years. However, now it is clear there has been an upgrade. The language of mathematics is now Category Theory. A natural question arises, how can someone steeped in the old language easily convert to the other. One answer has been started with the very elementary *Conceptual Mathematics* by Lawvere and Schanuel; however, a more advanced and complete tool for this task is *Sets for Mathematics* by F. William Lawvere and Robert Rosebrugh [Cambridge University Press, 2003. Paperback, 250 pp., $35, ISBN 0521010608].

This book develops the theory of the category of abstract sets with examples from automata theory, elementary algebra and differential equations. Further it brings out the common parts of algebra, analysis, combinatorics, and geometry.

It was most surprising for this mathematician to realize that the definition of products and sums of topological spaces are no accident, but follow from the laws of sums (Chapter 3) and products (Chapter 4) in Category Theory. Further, I was surprised to learn if one follows these laws that products of metric spaces are not what I thought.

In addition, *Sets for Mathematics* gives a transparent understanding to the Axiom of Choice (Chapter4). The Chapters on the Uses of Exponentials (Chapter 7), and on Variable Sets (Chapter 10) are enlightening..

For an advanced undergraduate student who intends to study algebra, analysis, combinatorics, and geometry, *Sets for Mathematics* is a must.