Preface

THIS BOOK IS ABOUT an amazing intellectual "collaboration" between two men who never met. The Englishman George Boole lived his entire life within the nineteenth century, while the American Claude Shannon was born in the twentieth and died at the beginning of the twenty-first. Boole, of course, never knew Shannon, but he was one of Shannon's heroes. It is because of Shannon that Boole is rightfully famous today, but it is because of Boole that Shannon first gained the attention of the scientific community.

What makes the cross-time relationship of these two remarkable men particularly interesting is that Boole was a pure mathematician, a man who lived in the rarefied, abstract world of the academic, while Shannon was primarily a practical, "get your hands dirty" electrical engineer. Despite this extreme difference in their worldviews, it is simply impossible to think of one of these men without thinking of the other. So many of the well-known scientific theories of our day are attached—rightfully or not—to a single name (it is *Einstein's* theory of special and general relativity, it is *Newton's* theory of gravity, it is *Maxwell's* theory of electrodynamics, it is *Darwin's* theory of evolution, it is *Schrödinger's* theory of quantum wave mechanics, it is *Heisenberg's* theory of quantum matrix mechanics, and so on), but when one hears of *Boolean* algebra one immediately thinks also of *Shannon's* switching theory. And vice versa. The two names are intimately entangled.

Later in his life Shannon's name did become uniquely attached to the new science of information theory, but even then you'll see as you read this book how the mathematics of information theory— probability theory—was a deep, parallel interest of Boole's as well.

What Boole and Shannon created, together, even though separated by nearly a century, was without exaggeration nothing less than the fundamental foundation for our modern world of computers and

information technology. Bill Gates, the late Steve Jobs, and other present-day *business* geniuses are the people most commonly thought of when the world of computer science is discussed in the popular press, but knowledgeable students of history know who were the real technical minds behind it all—Boole and Shannon (and Shannon's friend, the English genius Alan Turing, who appears in the following pages, too).

Read this book and you'll understand why.