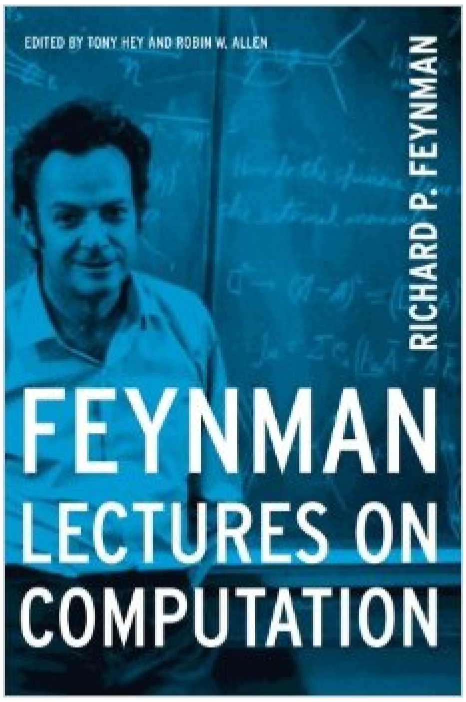
Feynman Lectures On Computation



Synopsis

"When, in 1984–86, Richard P. Feynman gave his famous course on computation at the California Institute of Technology, he asked Tony Hey to adapt his lecture notes into a book. Although led by Feynman,"

Book Information

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Customer Reviews

Yes, I think you can teach the theory of computation from this book. And you can learn it from this book. Some of the material isn't all that recent, but much of it doesn't need to be.35 years ago, if one were teaching a course on the theory of computation, I'd have recommended Minsky's book (it came out in 1967). That was a great text. Nowadays, there are numerous choices. But one could still use books that originally came out well before Feynman's notes, such as Lewis & Papadimitriou or Hopcroft, Motwani, and Ullman.The question boils down to the quality of what is in the book, as well as what material it has that other books do not, and what material it is missing that most other texts have.This book is quite readable and preserves much of Feynman's teaching style. So let's look at what it is missing. First, it doesn't talk much about real neurons. Of course, even Minsky doesn't dwell much on that, and other computation books avoid that topic too. But now, there's a more serious omission. Feynman spends something like two pages on grammars! If you were using Lewis and Papadimitriou (first edition) there would be a chapter of over 70 pages on context-free languages alone. As a teacher or a student, would you really want to miss all that?No, as a student, you would have to read up on all that material elsewhere. And as a teacher, you would have to use another book or write your own notes. That material is too much a part of most required curricula.But that doesn't take away from the value of the book when it comes to the rest of the material.

Of course, 'brilliant' is what you'd expect from Feynman. These lectures, originally presented in 1983-6, capture a number of the most fundamental, esoteric concepts in computing. Since Feynman is doing the explaining, however, the ideas come across clear and strong.Chapter 3, on the basic theory of computation, introduces not only the Turing machine, but also the basic idea of what things can and can not possibly be computed and why. He also explains the "universal" machine, and the meaning of universality that mathematically steps up from any one machine to all machines. The next chapters discuss coding theory. That has body of knowledge has since become pervasive in our every-day lives, even if it's never visible. After that two chapters present the physical limits to computation, and how computation can approach those limits using quantum mechanics.This includes the superfically odd idea of reversible computation. I say odd because, for example, knowing that two numbers add up to six doesn't tell you whether the two were five and one, zero and six, or some other combination. You normally can't run addition backwards from the sum to the summands, so standard addition is said to be irreversible. Reversibility gives amazing properties to a system, however, and things like the Toffoli gates show how it can be implemented.The only disappointments in this book come from the very beginning and very end. The beginning describes what a computer is, as if the reader had never heard of computers before. I guess that basic level is still needed, but is no longer needed at the college level. The very end describes silicon technology, as it was known in the early 1980s.

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