

Review of  
**Proven Impossible**  
**Elementary proofs of Profound Impossibility from Arrow, Bell, Chaitin, Godel, Turing, and more**  
**Author: Dan Gusfield**  
**Publisher: Cambridge University Press, 2024**  
**\$83.00 Hardcover, \$30.00 Softcover, 270 pages**

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## 1 Thats Impossible!

Some people outside of math think that statements like *you cannot write a program for HALT* are defeatist and pessimistic. They do not realize that these are rigorous theorems and that it is good to know what you can't do so you can modify your goals.

So clearly the layperson needs a book that gives coherent explanations of problems that are impossible to solve. The current literature seems to be in two categories.

1. Books for the layperson that are too fluffy and don't really get to the point.
2. Books for the layperson that oversell: Godel's theorem proves that humans are creative!
3. Technical articles for experts that are not helpful to the layperson, even if they give (allegedly) simpler proofs.

So this is a book for the layperson. How would it be for readers of this column? I suspect that  $\frac{2}{3}$  of the people reading this review will enjoy  $\frac{2}{3}$  of the book.

The chapters of the book do not quite correspond to theorem on impossibility since some such theorems have two chapters about them, or relate to other chapters. Hence I review the book, not *chapter by chapter* but *impossibility-result by impossibility result*.

## 2 Bell's Theorem

When Quantum Mechanics was first studied the question arose *can we model this using classical Physics*. This question would seem hard to formalize. Nevertheless, Bell's Theorem does just that: Classical Physics is formalized, and it is shown that quantum mechanics cannot be so described.

The explanation of Bell's Theorem is excellent. Amazingly it does not require knowing any quantum mechanics. The layperson will benefit; however, I suspect that my readers who don't live and breath quantum mechanics (that is, most of them) will benefit from this chapter.

I note for future reference that Bell's Theorem is a profound statement about how our universe works. I will later comment on the profundity of later chapters; however, none will top Bell's Theorem.

There are two chapters on Bell's Theorem.

- 3 Arrow's Theorem
- 4 Clustering
- 5 Godel's Incompleteness Theorems
- 6 Turing Undecidability
- 7 Chaitin's Theorem