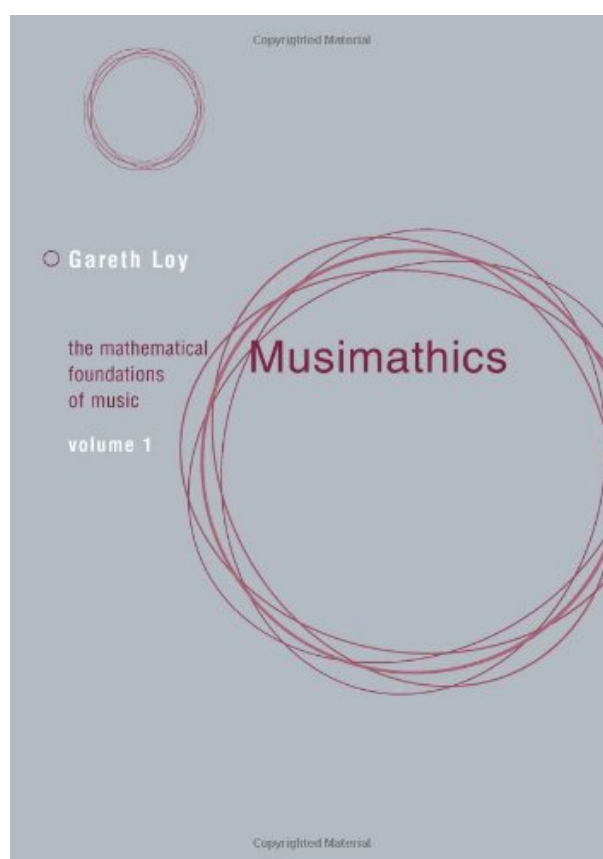
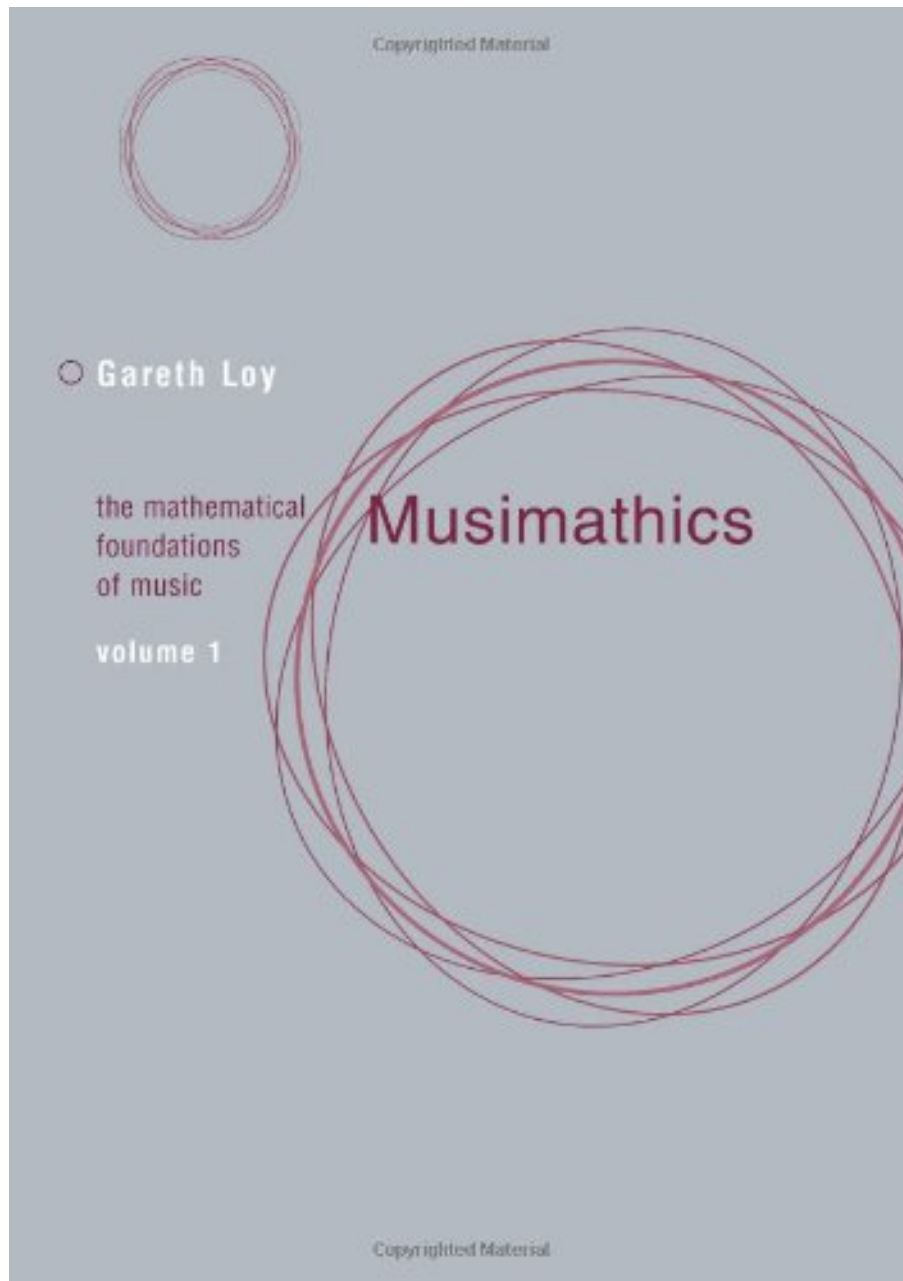


# MUSIMATHICS: THE MATHEMATICAL FOUNDATIONS OF MUSIC (VOLUME 1) BY GARETH LOY



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## Review

From his long and successful experience as a composer and computer-music researcher, Gareth Loy knows what is challenging and what is important. That comprehensiveness makes **Musimathics** both exciting and enlightening. The book is crystal clear, so that even advanced issues appear simple. **Musimathics** will be essential for those who want to understand the scientific foundations of music, and for anyone wishing to create or process musical sounds with computers.

(Jean-Claude Risset, Laboratoire de Mécanique et d'Acoustique, CNRS, France)

**Musimathics** is destined to be required reading and a valued reference for every composer, music researcher, multimedia engineer, and anyone else interested in the interplay between acoustics and music theory. This is truly a landmark work of scholarship and pedagogy, and Gareth Loy presents it with quite remarkable rigor and humor.

(Stephen Travis Pope, CREATE Lab, Department of Music, University of California, Santa Barbara)

## About the Author

Gareth Loy is a musician and award-winning composer. He has published widely and, during a long and successful career at the cutting edge of multimedia computing, has worked as a researcher, lecturer, programmer, software architect, and digital systems engineer. He is President of Gareth, Inc., a provider of software engineering and consulting services internationally.

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**Musimathics: The Mathematical Foundations Of Music (Volume 1) By Gareth Loy.** In undergoing this life, many individuals consistently aim to do and also obtain the ideal. New understanding, encounter, lesson, and also everything that can boost the life will certainly be done. Nevertheless, lots of people in some cases really feel puzzled to obtain those points. Feeling the limited of experience and also resources to be much better is among the does not have to have. Nevertheless, there is a very simple point that can be done. This is just what your educator always manoeuvres you to do this one. Yeah, reading is the response. Reading a publication as this *Musimathics: The Mathematical Foundations Of Music (Volume 1) By Gareth Loy* as well as various other referrals can enrich your life quality. Exactly how can it be?

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"Mathematics can be as effortless as humming a tune, if you know the tune," writes Gareth Loy. In *Musimathics*, Loy teaches us the tune, providing a friendly and spirited tour of the mathematics of music -- a commonsense, self-contained introduction for the nonspecialist reader. It is designed for musicians who find their art increasingly mediated by technology, and for anyone who is interested in the intersection of art and science.

In Volume 1, Loy presents the materials of music (notes, intervals, and scales); the physical properties of music (frequency, amplitude, duration, and timbre); the perception of music and sound (how we hear); and music composition. Calling himself "a composer seduced into mathematics," Loy provides answers to foundational questions about the mathematics of music accessibly yet rigorously. The examples given are all practical problems in music and audio.

Additional material can be found at <http://www.musimathics.com>.

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Extraordinary Beyond the Title, a must for all Math Lovers

By Let's Compare Options Preptorial

The sad thing about this series is that the keywords that invite readers to stop by, hide the fact that these texts go far beyond music, to USE music as a gentle introduction to extremely complex, relevant and timely math concepts. The best teachers use four paths to explain a math concept: verbal, formulaic, algorithmic and pictographic. These help the brain comprehend the topic regardless of our learning modality. The authors here are simply MASTERFUL math teachers, and clarify everything from Eulers Law (relation of  $e$ , the base of the natural logarithms to  $\pi$ , the base of the trig functions) to Fourier Transforms, in a way that a bright High School student will get. If you've been out of math (any math) for a long time, and want a masterful review of math concepts and techniques, this series is THE place to start. You can then extend that foundation to many other applied areas, from signal processing to physics, voice recognition, etc. Fourier transforms (and their more recent spin off in Cepstrums) are being used in too many fields to list today, from radar and electronic engineering, to whale songs.

In every section, the author's excitement is contagious. Rather than give a bunch of dry proofs that reek of hubris and disregard for the reader, Gareth uses a "curious mind" tone, as if he were just learning and discovering this too, like a kind of puzzle or murder mystery. Loy is Monk, Holmes and Columbo combined. For example, he gives a few expansion series for  $e$ , then says: "Wow, there seems to be a striking and beautiful pattern here, doesn't there? Wonder what it can be?" Leave it to a guy into both math and music to see the wonder in a time series!

One more example. Any texts on waveforms have to involve deep calculus, especially PDE's. Unfortunately, deep PDE's don't happen until grad school. But, rather than assume the reader uses calculus all day long, Loy starts with the basics at "now let's see how the first derivative is actually slope finding and integration is the area covered by the moving curve..." including those perhaps more musically inclined who have forgotten what a derivative is. Astonishingly, Loy sneaks around the dry topic of limits to use MUSIC as a great practical refresher on calculus (p. 263 of the second volume, in the section that is the hottest topic in Physics today, from Astronomy to Medical Imaging to of course music: Resonance).

Gareth is one of the few mathematicians around who can relate math to the astonishment of life around us. After all, our brain is doing advanced Fourier Transforms every time we cross a street in traffic, and when we get an MRI, the Fourier Transforms that convert magnetic alignment to pictures are assuming that the atoms in our body are a song, which when pulsed with a radio wave, will sing the positions of their water molecules back to us in harmonics that can be seen as well as heard.

Highly recommend this series, not only for everyone interested in math and music, but math and life!

29 of 30 people found the following review helpful.

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2 of 2 people found the following review helpful.

Math and music

By David Lynch

I have always wondered about the differences between a note played on different instruments, and how this affects the sound wave, and this book explained this well. I am a computer geek considering a programming project involving music. This book gave me the background I was looking for, but does not cover any of the programming aspects of real time midi input and sound output.

There is quite a bit of math and physics in the book and I did skip quite a bit of it.

There is also quite a lot of information on different scales and changes in the frequency of notes through history.

I took piano lessons as a kid, but don't have a good understanding of the different keys and scales so this was tough for me, but also very interesting.

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