Listening to Music

No matter how complicated the music (or data), from Mozart to Twisted Sister, it is stored on disks using only the numbers 0 and 1. To do this, many different branches of mathematics, both advanced and elementary, are used at each step of the process.

Signal Processing: The original sound is sampled, measuring the sound waves at regular, frequent intervals. How frequently depends on the Shannon Sampling Theorem.

Binary Arithmetic: The amplitudes are represented as a sixteen-bit sequence of 0's and 1's. The 0's and 1's are stored on the CD as smooth areas and pits.

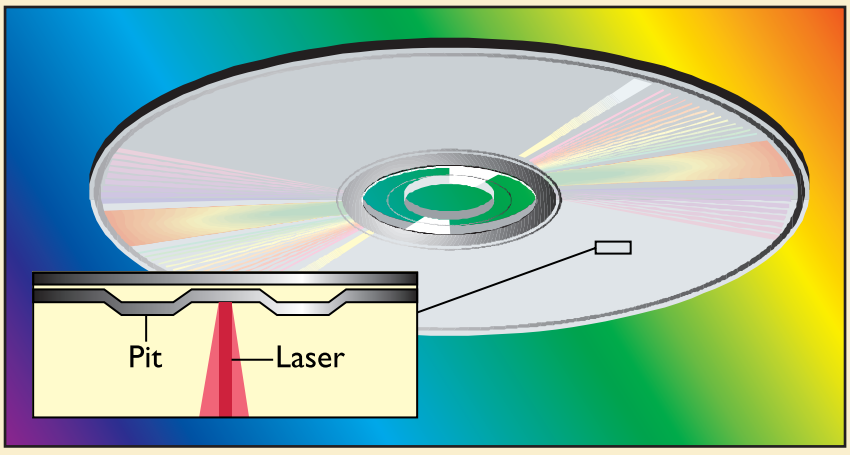
Partial Differential Equations: Equations in fluid dynamics govern the process of compressing the reflective and protective layers over the data.

Linear Algebra: Inevitable corruptions of the 0's and 1's (dust or scratches, for example) are compensated for with error-correcting codes.

Trigonometry and Calculus: To retrieve the data, a tracker moves a laser which is focused on the data. As the laser reads from the center of the disk to its edge, a motor must continually move the CD slower to keep the speed of the data reading constant.

For More Information:

Scientific American, Ken C. Pohlmann, 1998.



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