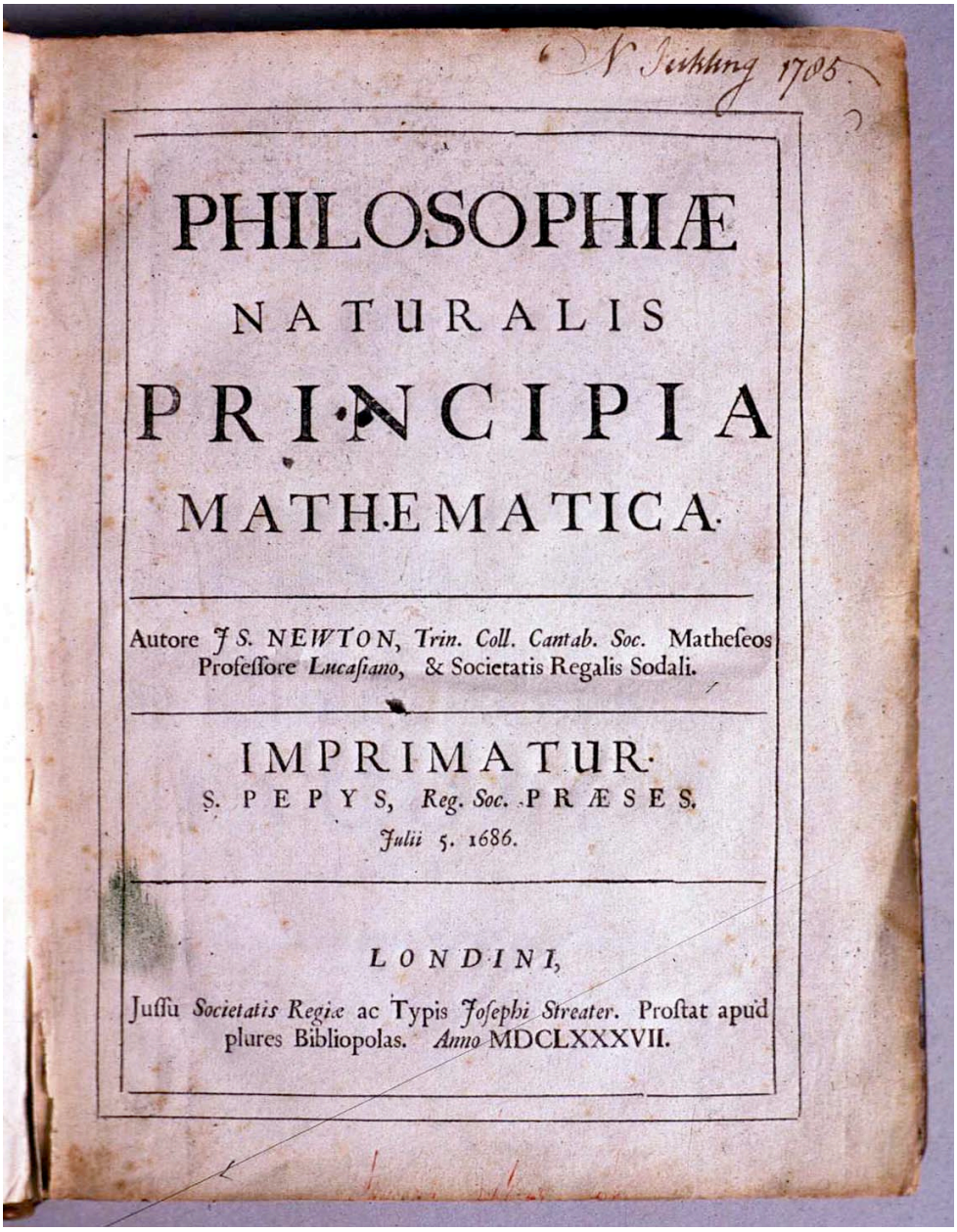
Calculus? What's that?

Joe Puccio • Woods Charter School • December 27, 2021



PHILOSOPHIÆ
NATURALIS
PRINCIPIA
MATHEMATICA

Autore *J. S. NEWTON*, *Trin. Coll. Cantab. Soc.* Matheseos Professore *Lucasiano*, & Societatis Regalis Sodali.

IMPRIMATUR.
S. PEPYS, *Reg. Soc.* PRÆSES.
Julii 5. 1686.

LONDINI,
Jussu *Societatis Regiæ* ac Typis *Josephi Streater*. Prostat apud plures Bibliopolas. *Anno* MDCLXXXVII.

The ancient Greek philosopher Democritus (460 BCE - 370 BCE) is the recorded as the earliest person to consider an object being divided into an infinite number of subparts (History of Calculus 1). Although Democritus was unable to apply the concept to the calculation of area and volume. Around five decades later, the Greek mathematician Eudoxus is accredited with the method of exhaustion: determining area and volume by breaking objects into infinitely calculable shapes. The Greek mathematician Archimedes (287 BCE - 212 BCE) is recorded as the first to discuss a tangent to a curve, a crucial concept in differential Calculus. All of these men contributed to the eventual formulation of Calculus in the late seventeenth century.

In the mid-seventeenth century, Isaac Barrow, Pierre de Fermat, Blaise Pascal, and John Wallis are known to have discussed the concept of a derivative or the rate of change of an equation. These european mathematicians developed methods for calculating maxima, minima, and tangents to curves. The discovery of Calculus, however, is often attributed to two men: Sir Isaac Newton of England (1643-1727) and Gottfried Leibniz of Germany (1646-1716). Both intellectuals are attributed with the independent founding of Calculus, although Leibniz published his findings first (Calculus).

Newton viewed Calculus as a description of the generation of magnitudes and motion. While Leibniz focused on the previous notions of a tangent to a curve and believed that Calculus was a metaphysical explanation of change. Consequently, their conclusions and approaches are different, which invalidated many of the accusations of plagiarism made by shared students, peers, and each other.

"While Newton considered variables changing with time, Leibniz though of variables x and y as ranging over sequences of infinitely close values. Leibniz introduced dx and dy as differences between successive values of these sequences." (The History of Calculus 2) This difference in intuition is likely why Newton was responsible for much of Calculus' application, while Leibniz established much of the modern notation. For instance, if Newton were to have been responsible for notation, modern Calculus may have been known as the "method of fluxions."

It is certain that these two remarkable figures did not formulate the modern theorems themselves. In fact, Newton wrote that his own early ideas about Calculus came from "Fermat's way of drawing tangents." (Calculus Gems) Therefore, all those ranging from ancient Greece to seventeenth century Europe should be referred to as cofounders of Calculus.

Bibliography:

1 "History of Calculus." *Wikipedia*. N.p., 10/25/2010. Web. 25 Aug 2010. <http://en.wikipedia.org/wiki/History_of_calculus>.

2 "The History of Calculus." *University of Iowa*. N.p., Unknown. Web. 25 Aug 2010. <http://www.uiowa.edu/~c22m025c/history.html>.

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