Peter Borwein

May 10, 1953 - August 23, 2020

[183, 2783, 1978, 2020, 2, 2, 9]

Wikipedia: https://en.wikipedia.org/wiki/Peter_Borwein

Personal Homepage: http://www.cecm.sfu.ca/~pborwein/

Essay by Vivian Choong

Peter Borwein was a Canadian Mathematician and professor at Simon Frasier University that specialized in classical analysis, computational number theory, Diophantine number theory, and symbolic computing. Peter Borwein comes from a family of two other doctors in mathematics: Jonathan Borwein and David Borwein. After finishing his undergraduate studies in honors mathematics at the University of Western Ontario in 1974, Borwein completed an M.Sc. and Ph.D. at the University of Western Columbia, with his dissertation on rational approximations.

The two Borwein siblings created the Center for Experimental and Constructive Mathematics (CECM) at Simon Fraser University in 1993. Peter later founded the Center for Interdisciplinary Research in the Mathematical and Computational Sciences (IRMACS) at the same university. This was where Peter Borwein served as Director for many years. He also served on the editorial boards of several journals, including the *Ramanujan Quarterly* and the *Electronic Transactions on Numerical Analysis*.

David H Bailey, a good friend and coworker of both Borwein brothers, came upon their work in 1983 when reading about their recent discovery of quadratically convergent algorithms for pi and elementary functions. After reading this article, Bailey began programming using some of the techniques in the article, then reached out to Peter and Jonathan about his results. Thus started the long collaboration between Bailey and the two Borweins, beginning with the paper *Ramanujan, modular equations, and approximations to Pi,* published in the American Mathematical Monthly in 1989. This collaboration continued over the next decade, resulting in over one hundred joint papers and books between Bailey, Peter Borwein, and Jonathan Borwein.

Borwein's most known paper was, *On the rapid computation of various polyarithmetic constants* published in 1997. This paper presented a surprisingly simple algorithm in calculating binary digits of bi beginning at an arbitrary starting position, also known now as the "Bailey- Borwein-Plouffe formula":

$$\pi = \sum_{k=0}^{\infty} \left[\frac{1}{16^k} \left(\frac{4}{8k+1} - \frac{2}{8k+4} - \frac{1}{8k+5} - \frac{1}{8k+6} \right) \right]$$

Borwein was diagnosed with multiple sclerosis before 2000 and, on August 23, 2021, passed away due to pneumonia stemming from his MS. Upon interview, one of his doctoral students, Kevin Hare, mentioned that Borwein had planned his life to deal with his multiple sclerosis, utilizing the time he had to the fullest extent. Despite all his health complications, Hare comments on Borwein's character as a generous person who was always willing to help his students.