Review: [Untitled]

Reviewed Work(s):
An Imaginary Tale: The Story of #-1. by Paul J. Nahin
Ricardo Diaz

The American Mathematical Monthly, Vol. 106, No. 6. (Jun. - Jul., 1999), pp. 593-594.

Stable URL:
http://links.jstor.org/sici?sici=0002-9890%28199906%2F07%29106%3A6%3C593%3AAITTSO%3E2.0.CO%3B2-S

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Sat Dec 22 05:29:22 2007

REVIEWS

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An Imaginary Tale: The Story of $\sqrt{-1}$. By Paul J. Nahin. Princeton University Press, 1998, xvi + 257 pp., $24.95.

Reviewed by **Ricardo Diaz**

An Imaginary Tale is a leisurely, entertaining, idiosyncratic account of the development of the complex number system that can be enjoyed both by novices who know very little about complex numbers and by experts who think they know almost everything about them. The author, a professor of electrical engineering who also writes science fiction, has a special talent for expressing his infatuation with this fascinating topic. This accomplished raconteur has artfully avoided a direct chronological presentation of his story. He flouts the tedious conventions of linear time to successfully weave a complicated tapestry that combines historical anecdotes, doggerel, mathematical puzzles, fascinating calculations, the occasional theorem, and even samples of Cauchy's love letters.

In the first half of the book, you will learn how close the Babylonians came to inventing i, discover the name of the Norwegian surveyor who gave complex arithmetic its first geometrical description (a decade before Argand), and marvel at the discomfort many distinguished mathematicians (including Leibniz, Boole, and Airy) suffered in the presence of the imaginary. If you proceed to the second half, you will be exposed to a crash course in contour integration and the Cauchy-Riemann equations, plus a sampling of applications in engineering and pure science. You will also see some beautiful gems from pure mathematics, such as Euler's heuristic argument for expressing the sine function as an infinite product, culminating in his derivation of the identity $\pi^2/6 = \sum_{n=1}^{\infty} n^{-2}$. As a bonus, you will find in the appendices a discussion of how i^i was once computed to 135 decimals in 1921 using tables of logarithms.

Of course this book is not a textbook, nor a scholarly treatise on the history of mathematics, and we must not judge it by pedantic standards. The aim of this book is far more ambitious than that of a textbook intended to instruct: this book was written to inspire and delight. Mathematics instructors at the college level will savor the amusing anecdotes and pass on choice items to colleagues and students. Eager undergraduates will enjoy learning that great mathematicians struggled over ideas that are now taken as obvious, and bright high school students will discover the adventures that await them if they persevere in their mathematical education.

The enthusiastic author sometimes ascends to heights that most of his intended audience will be unable to follow, as in his discussion of the functional equation for the Riemann zeta function. Setting such passages aside, there is still a tremendous quantity of simple but elegant mathematics to enthrall, amuse, edify, surprise, and enchant even the most jaded of mathematical sophisticates. This is

indeed a rare book: one that lives up to the self-praise that adorns its jacket. Professor Nahin has delivered the real goods.

The reader who wishes to explore the history of the complex number system in greater depth may also wish to consult another informative, albeit less whimsical, book: *Numbers*, Heinz-Dieter Ebbinghaus et al., Springer, 1991.

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Leaning Towards Infinity. By Sue Woolfe. Faber and Faber, Boston, 1997 (originally published by Random House Australia, 1996), xxi + 393 pp., $24.95 hardcover, $14.95 softcover.

Reviewed by **John Beebee** and **Karen Willmore**

Are you curious about why men outnumber women in your advanced mathematics classes? Or are you interested in what a gifted writer who claims to know nothing of mathematics thinks about the feelings and motivations of its practitioners? If so, then you will find this a tempting novel, as we did. Its premise is that the search for truth in life, love, and mathematics is a messy and risky business.

> I think it all began because of the shape of my mother's breasts. And it definitely began with something my mother wrote on the margin of a page stuck on the wall: Frege said that the line connecting any two points is already there before we draw it. (p. 3)

What is this "it" described by Frances Montrose, a gifted amateur mathematician, damaged daughter of another gifted amateur, Juanita, and mother of her biographer, Hypatia? (And what if the Bernoullis had been mothers and daughters instead of fathers and sons?) Frances has just won a competition for amateur mathematicians and has the opportunity to present the joint ideas of herself and her mother at a conference in Athens, Greece, the birthplace of modern mathematics. In another possible beginning, Hypatia summarizes the plot as the story of "an Australian woman who'd never had any formal mathematics training but who in 1995 carried across the world, inside a borrowed suitcase and amongst ball dresses, a bulging three hundred and fifteen pages of revolutionary theorems, and something else no one knew about—the beginnings of the discovery of a new kind of number" (p. xiii).

The emotional core of the novel is interwoven around four generations of unresolved mother-daughter relationships. Beautiful Juanita, abandoned by her self-centered mother, is a mathematical genius who in unthinking rebellion marries a man who can't count past ten. Her mathematics, compulsively pursued during stolen time, almost reaches a breakthrough. She pins her love and her mathematical dreams on her beautiful son, who has no use for either. Frances, her very plain daughter, is so consumed with trying to win her mother's love and recognition by completing her mother's mathematics that she neglects her own daughter, Hypatia