Vedic Mathematics

Magical Methods for Mathematical Manipulation?

February 11, 2009

Why a talk about Vedic Mathematics?

- *Pragmatism* – how to make my sabbatical project "A search for appropriate functions for approximate linear programming solutions to queueing network problems" interesting to a general audience?
- *Curiosity* – I'd received email solicitations for books and curriculum.
- *Religion* – "Vedic" means from the Vedas

Disclaimers and an Invitation

- I've only just begun to study this subject.
- I have not formally studied the history of mathematics or non-European mathematics.
- Other than some Asian history classes while in college, I've not studied Indian history nor the Hindu religion
- Please speak up if you have anything to add about any of these topics!

What is Vedic Mathematics?

- Vedic period begin around 1500 BC and ended after 500 BC
- Vedas (Books of Knowledge) are the most sacred Hindu Scriptures
- Atharvaveda – supposedly contains a set of sixteen *sutras* that describe all of mathematics
- *Sutra* is often translated *word formula* and is short and easily memorized and recited
- Vedic Mathematics is a system of mathematics based on these sixteen sutras

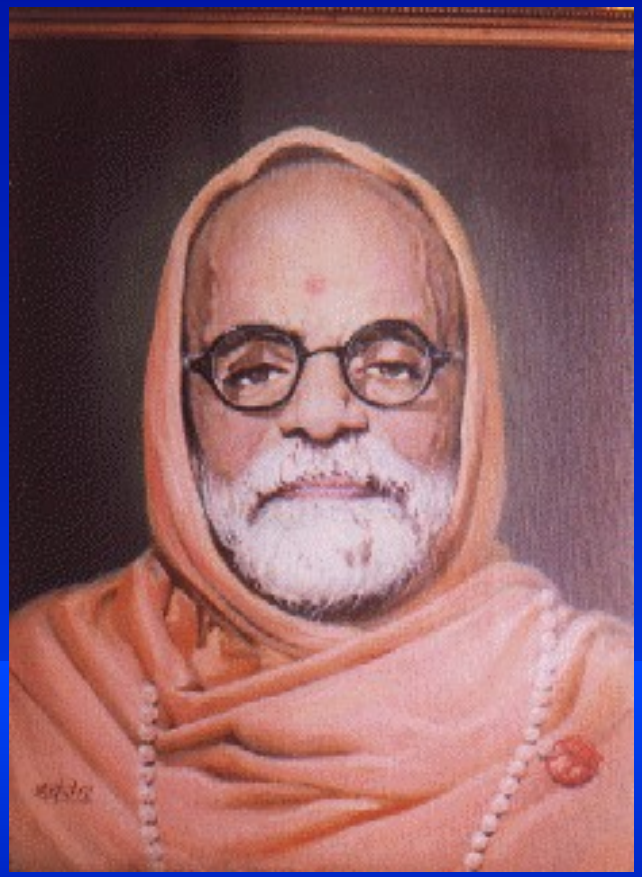
A Little History

- Several important mathematical concepts came out of the subcontinent
  - Decimal place value system
  - Arabic numerals based on symbols used here
  - Zero (also discovered independently elsewhere)
- Mathematical astronomy in use by third millennium B.C.

A Little History

- Mathematics was used during Vedic period for the construction of alters
- Jainism followed the Vedic period and found mathematicians working with
  - cubic and quartic equations,
  - permutations and combinations,
  - a rather developed notion of infinity, including multiple “levels” or “sizes” of infinity

Jagadguru Swami
Sri Bharati Krsna Tirthaji Maharaja



- Born in 1884 to an educated and pious family
- Received top marks in school
- Sat for the M.A. exam of the American College of Sciences (Rochester NY) in Sanskrit, Philosophy, English, Mathematics, History and Science.

Image Source: http://www.vedicmaths.org/Community/whos who/Tirthaji portrait.gif

Jagadguru Swami
Sri Bharati Krsna Tirthaji Maharaja

- Became Sankaracharya (major religous leader) of Govardhana Matha (akin to a monastery) in Puri, a city in the east Indian state of Orissa
- Wrote sixteen volumes based on sixteen Sutras written 1911-1918
- Volumes were unaccountably lost without a trace
- Rewrote manuscript from memory in 1956-7 before touring the USA; published posthumously in 1965 as “Vedic Mathematics”

The Sixteen Sutras

- By one more than the one before
- All from nine and the last from ten
- Vertically and cross-wise
- Transpose and apply
- If the Samuccaya is the same it is zero
- If one is in ratio the other is zero
- By addition and by subtraction
- By the completion or non-completion

The Sixteen Sutras

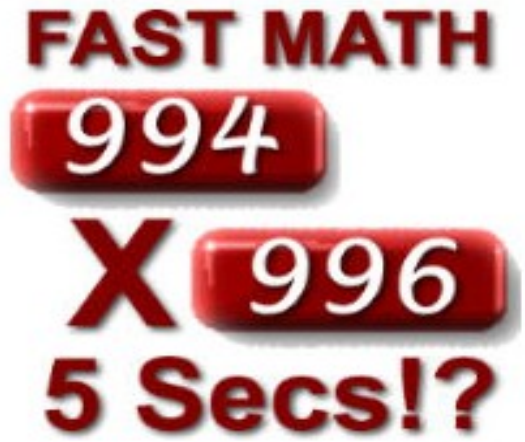
- Differential calculus
- By the deficiency
- Specific and general
- The remainders by the last digit
- The ultimate and twice the penultimate
- By one less than the one before
- The product of the sums
- All the multipliers

Examples from the Sutras

- 1. By one more than the one before
- 2. All from nine, the last from ten
- 3. Vertically and cross-wise
- Others

Claims about Vedic Mathematics

You'll Be Able To Solve Problems Like 994 X 996 In 5 Seconds Without Using A Calculator



The answer is **990024**..... That was fast huh? Well, that's just an example of how fast you'll be able to calculate answers to some of the toughest math problems. With this powerful system that I've been telling you about, you'll be able to simplify math problems from multiplication, algebra, to trigonometry, and more.

Just imagine being able to multiply numbers, such as **46 x 44**; **82 x 88**, and **995 X 995** in your head as fast as a speeding calculator! You, being able to impress your family, friends, co-workers, and teachers with your newly acquired skill.

Though some calculations will still require pen and paper, your speed and the ease in which you find the answer will be greatly enhanced. I'm sure I don't have to tell you this, but numbers, words, and algebra are the building blocks of mathematics, and once these aspects are mastered, which ***this unique method will enable you to do***, then other areas of mathematics will be ***a breeze for you***.

And after today, you'll be able to manipulate and solve problems in record time- as simply as 1, 2, 3 once you say yes to **Vedic Mathematics Secrets**

Source: http://www.vedicmathematicssecrets.com

Claims about Vedic Mathematics

"Perhaps the most striking feature of the Vedic system is its coherence. Instead of a hotch-potch of unrelated techniques the whole system is beautifully interrelated and unified: the general multiplication method, for example, is easily reversed to allow one-line divisions and the simple squaring method can be reversed to give one-line square roots. And these are all easily understood. This unifying quality is very satisfying, it makes mathematics easy and enjoyable and encourages innovation."

http://www.vedicmaths.org

Claims about Vedic Mathematics

"Now here's a chance that maths is not going to be a nightmare for school kids any longer. The introduction of Vedic mathematics by Magical Methods Training has made it possible for students to overcome simplistic methods like finger counting, which often lead to mistakes."

The Hindu, Delhi Edition, May 27, 2008

"Addition, subtraction, fractions and tables are not to be feared as Vedic mathematics comes to the rescue"

The Statesman, Delhi Edition, May 15, 2008

Claims about Vedic Mathematics

"This system is not a new trendy way of teaching math; it is a system that is as old as numbers themselves. The Vedic system is deeply rooted in mathematical logic, trigonometry, calculus and algorithms. By learning Vedic math, your child will have an understanding of the very foundation of mathematics."

http:www.mathmonkey.com/vedic.php

Summary of Claims

- found in ancient Hindu Vedas
- provides insight into all of mathematics
- simplifies computation
- makes math easy and fun to learn

Literature

- A quick survey of literature shows that there are not many articles addressing this issue
- Those that do mostly fall into two categories:
  - Specific applications of particular aspects, e.g.
    - “A Vedic Method for Subtraction” by Sue Forsythe
    - “VLSI Implementation of RSA Encryption Using Ancient Indian Vedic Mathematics” by Thapliyal and Srinivas
  - Critiques of claims of Vedic heritage, e.g.
    - “Myths and Reality: On 'Vedic Mathematics'” by S.G. Dani

Critique: VM found in the Vedas

- Are the sutras found in the Atharvavada?
- Well no, but they are in a Parishishta (appendix)
- Which Parishishta? - when asked this in 1950 BKT reportedly said “they occurred in his own Parishishta and not any other.”
- Editor of 1965 book agreed with BKT that “by definition” the Vedas should contain all knowledge, regardless of when it was discovered, making VM really is 'vedic.'

Critique: VM found in the Vedas

- Some VM operations deal with concepts that were not developed until much later
- For example, decimal form of fractions; converting 1/19 to decimal form using “one more than the one before”

Critique: VM encompasses all math

- This is claimed by BKT and many today who want to use VM to sell something
- Speaking of the sutras, BKT wrote “there is no part of mathematics, pure or applied, which is beyond their jurisdiction”

Critique: VM encompasses all math

- The Academy of Vedic Mathematics website says

  "*These striking and beautiful methods are just a part of a complete system of mathematics which is far more systematic than the modern 'system'. Vedic Mathematics manifests the coherent and unified structure of mathematics and the methods are complementary, direct and easy.*"

Critique: VM encompasses all math

- Emphasis in vedic mathematics is on speed and mental computation
- Rules are based on observed patterns and taught by repetition rather than on justification as to why they work
- Vedic mathematics primarily focus on mathematics typically taught at the middle and high-school level; it does not address advanced mathematical concepts

Critique: VM simplifies computation

- This may be indeed be true...
- The approach is similar to that taken by other "speed math" systems (Trachtenberg, Meyers), taking advantage of patterns
- Works well in certain situations, e.g.
  - Subtraction from a power of 10
  - Product of numbers near the same power of 10
  - Product of 2-digit numbers with same first digit and second digits that sum to 10

Critique: VM make math fun to learn

- The main premise of vedic mathematics based curriculum seems to be:
  if a student can learn how to do a computation quickly and be "good at it" then they will enjoy it and want to learn more.
- This does not appear to be the case in India, where vedic mathematics is taught more by reciting the sutras and emphasizing the religious connection.

Religious/Political Issues

- Hindu Nationalism grows during the 20th century
- Hindutva agenda includes asserting how Vedas speak to modern science and mathematics
- Bharatiya Janata Party (BJP) ruled India 1998-2004; currently is leading opposition party
- BJP president Rajnath Singh had history texts rewritten and vedic mathematics included in syllabus during tenure as Uttar Pradesh education minister

Religious/Political Issues

- Templeton Foundation Fellow Meera Nanda argues strongly against the injection of vedic science (including mathematics) into Indian education and research.
- Consider the following quote from a 2003 article in *Frontline*, a leading Indian news magazine

Astrology is flourishing as an academic subject in public and private colleges and universities, and is being put to use in predicting future earthquakes and other natural disasters. Such "sciences" as Vastu Shastra and Vedic mathematics are attracting governmental grants for research and education. While the Ministry of Defence is sponsoring research and development of weapons and devices with magical powers mentioned in the ancient epics, the Health Ministry is investing in research, development and sale of cow urine, sold as a cure for all ailments from the Acquired Immune Deficiency Syndrome (AIDS) to tuberculosis (TB). Faith-healing and priest-craft are other "sciences" receiving public and private funding. In the rest of the culture, miracles and superstitions of all kinds have the blessings of influential public figures, including elected Members of Parliament.

Religious/Political Issues

- Kandasamy and Smarandache – 2006 book analyzing effectiveness of vedic mathematics in Indian education.
- Study focuses on five groups of people
  - Students
  - Teachers
  - Parents
  - Educated Professionals
  - Public, including public servants

Religious/Political Issues

- Responses from all five groups are critical of vedic mathematics curriculum
- Students did not like the recitation of the sutras and felt that the techniques were simpleminded and didn't add anything to the mathematics they had already learned
- Non-Hindu students objected to Hindu imagery and context in mathematics curriculum materials

Religious/Political Issues

- Teachers found curriculum to be overly simplistic
- Some are quite critical of curriculum and of those chosen to write the forward sections that appear in the book as non-mathematical
- Some believe that vedic mathematics is introduce with ulterior motive to promote Hindutva agenda

Religious/Political Issues

- The parents expressed the belief that the vedic mathematics curriculum is more about teaching Sanskrit sutras than mathematics
- “More religion than mathematics”
- The responses from the educated and public sectors were varied, but included concern for the ulterior motives behind the introduction of the vedic curriculum

Vasantha Kandasamy

- Ph.D. In 1980
- Lecturer and Assistant Professor at Indian Institute of Technology Madras for last 20 years
- More than 295 research publications
- More than 36 books
- Advocate for social justice within IIT

Image Source: http://mat.iitm.ac.in/~wbv/vasanta.jpg

Vasantha Kandasamy

- History of confrontation with IIT officials; she claims she's been passed over for raises and promotions as a result
- Wants IIT to accept “Backward and Dalit” students and faculty
- In 2006 she was given the Kalpana Chawla Award by the Tamil Nadu Chief Minister for her social justice efforts within IIT